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April 30, 1975 Vol. IX, No. 18

Monitors + Packages + Common Sense = $1.5 Million

By Don Leavitt
Of the CW Staff

HARTFORD, Conn. – Real savings of more than $1.5 million a year on DP equipment costs – that's the record of the technical planning and evaluation group at Pratt & Whitney Aircraft, according to Edward F. Murray, the group's supervisor.

Leading the performance measurement workshop in a recent Computer Caravan here, Murray described how the five people in the group achieved that remarkable result in just over 16 months. They used an assortment of hardware monitors, software packages and common sense, he said, as they explored ways of improving utilization of the equipment while maintaining performance for the end users.

In December 1973, Pratt & Whitney had three major computer systems and a vast pool of shared peripherals. An IBM 370/168 with 3M bytes of memory, 10 channels and two 2305 drums was used for batch work under OS.

A 165, also with 3M bytes of memory and 10 channels, was geared to batch and IMS; a 1.5M-byte 158 with four I/O channels handled work in a VM environment. The center also had 104 tape drives, 60 2314-type disk drives and 52 spindles of 3330 disk storage, Murray recalled.

100% Utilization Impossible

As the group got into its work, it recognized utilization of 100% of the systems' theoretical limits was simply not possible; there is a practical limit and regularly using capacity beyond that point, as yet undefined, would maximize delays to the users, it found.

To determine how much of each system was actually being used, Murray set up a profile of measurements. Percent busy, as measured by hardware monitors, was the measurement for CPU and channel activity. The percent of space allocated on disks and drums was determined through a utility program, he said.

The normal hardware meters were used to "clock" percent of time busy for tapes and unit record equipment, since this approach "avoided the expense of hooking the monitor to these devices." It also showed clearly when the units actually were used and when they weren't, even though runbook instructions indicated otherwise.

Detailing "space allocated" rather than "space used" seemed appropriate for disk and drum, Murray said, since the allocated blocks were un-

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CW Special Report – A Guide to Performance Measurement – Follows Page 24

Cash and Carry

Candy, cigarettes, soft drinks . . . punch cards? Kansas University students are biting the bullet and pushing the button on vending machines for their cards these days. See story on page 5.

Called a Bad Approach

Privacy Act Vagueness Rapped

By Ronald A. Frank
Of the CW Staff

NEW ORLEANS – The federal Privacy Act of 1974 is a bad approach to privacy legislation because it seeks to apply one set of standards to too many situations, according to Mary C. Lawton, deputy assistant attorney general in the Department of Justice.

Because much of the language in the bill is unclear as to its intent, it will be difficult to administer the act when it becomes law later this year, she added.

Among the problems is the lack of any congressional appropriation to administer the requirements of the bill.

One of the most important parts of the act calls for a description of each federal data bank of personnel information to be published in the *Federal Register*. When the Privacy Act takes effect in September, Lawton said, the *Federal Register* may be larger than all the phone directories in the country, just with descriptions of all the government data banks.

While the act specifically does not apply to corporations, it is unclear whether individual small businessmen are covered by it, she said. The bill talks about the "life of a record" but there is no one definition on the length of a record's life, she added.

The question of who owns a record created during an interview and which party will thereby have access to the information is also unanswered, she said.

Despite its relatively poor wording and the difficult problems in attempting to implement it, Lawton said she agreed in concept with what the bill intends to accomplish. In order to rectify its inconsistencies, she said, the act will probably be replaced by several bills more tailored to preserve privacy in specific situations.

"It will probably be piecemealed to death," she predicted.

Other speakers at the Interface '75 session dealing with privacy problems pointed out the bill is limited to government agencies primarily and it is expected additional federal legislation will be introduced to deal with privacy abuses relating to the private sector.

Taking issue with the current abuses related to the insurance and medical industries, Benjamin Lipson, a life insurance broker, said the blanket authorization signed by applicants for insurance, "is the source of most of the abuses for which the computer industry is blamed.

"The insurance industry, either through the mail or by the use of credit reporting company employees, traffics immorally with these photostatic blanket forms," Lipson told the attendees.

"John Q. Public has no comprehension as to what happens to these forms after he signs them. Sacred, confidential information – which in many cases is not pertinent to either the underwriting of his insurance or the settling of an insurance claim – is extracted from its source and placed in the hands of the computer."

These authorizations to obtain private information are actually search warrants issued without the process of law, Lawton charged.

"Individuals armed with these

(Continued on Page 4)

DOS Used Longer, Harder at 370 Sites But 360 Shops Keep Going, Group Finds

By Don Leavitt
Of the CW Staff

ST. PAUL, Minn. – "The typical DOS shop" is a statistical fantasy, but data gathered recently by the Minnesota DOS Users Group shows DOS installations are still very much in operation, often with configurations quite different from what IBM originally planned for the various models of the 360 and 370 lines.

The group is an independent organization of users who see shared self-help as the best way to improve their separate operations. "Organization" may be too strong a term; there are no dues and no membership requirements – the members just meet once a month to share information.

Several months ago, the users saw a need to collect information about DOS installations so common interests could be clearly identified.

A survey form was developed and sent out with hopes of building a useful and consistantly organized file on the participating DOS shops, according to Tom Teresi, MIS manager at Indianhead Truck Lines, who volunteered to act as secretary for the group.

The 106 installations answering the group's appeal for information run the gamut in hardware from 64K 360/30s through a 1M-byte 370/158. A movement toward 370s is seen even in this small a sample: there are 43 shops with 360s and 63 with 370s.

Acquired in large measure from IBM, but from a number of third-party sources as well, the CPUs are operating under a broad spectrum of DOS releases, from 24.0 through 30.1. The 370 shops have all gone to the "370-oriented" releases, but half-a-dozen 135s and a pair of 145s are using Release 27 and have not gone to VS.

Curiously, four of the 360 CPUs shown in the survey data operate under Release 27, although that was supposed to be usable only on 370s since it was coded, in part, with 370 instructions. A reference to Itel as the vendor of one of these apparently misplaced 360s suggests how they are able to use "27:" Itel has developed a simulator for the 370-style instructions that runs on 360s.

The 370s in the survey tend, naturally, to be larger than the 360s. This general expansion in main memory size has been used

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Illinois Unionizing DPers

By Patrick Ward
Of the CW Staff

SPRINGFIELD, Ill. – Programmers picketing? It could happen in Illinois where Gov. Dan Walker has issued an executive order to bring DPers and all other state employees under collective bargaining.

Under the policy, DP personnel – from analysts to operators – will be in one craft union unit, instead of melded in with general clerical personnel as in most existing unions which include DPers.

The governor's goal is to improve working conditions and give employees more say about their jobs, according to Ivan L. Schraeder, staff counsel for the Illinois State Employees Association (ISEA).

The professional units will be able to vote for the particular union they want to represent them, Schraeder said. So far, the ISEA is the only union trying to enroll DPers, he said.

Programmers, analysts and computer operators will probably belong to the same professional unit, which will enlist peo-

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Ill. Governor Orders DP Unionization

(Continued from Page 1)
ple in those job categories across state government, Schraeder said. The unit hasn't been formed as yet.

"We'll revise these units if we don't think members in a proposed unit show a commonality of interest," he added.

There remains some question of whether "degreed people and support people share that commonality of interest," he said.

Most DP labor/management disputes will probably center around working conditions, Schraeder predicted.

Even at the highly skilled levels, state DPers "are told you will do this in this manner," the union official said. "There is very little encouragement by the state for individual professionalism."

Morale is low and DP turnover "just phenomenal," Schraeder said. Employees trying "to present problems to noncomputer people find some difficulty in being understood," he said.

"Collective bargaining would set up means whereby computer people could get their work problems reviewed by people with a computer background," he said.

The DP employees should like to have greater control over scheduling work hours, Schraeder said. "This kind of work requires an alert mind" and the employees know best what hours they can and cannot work, Schraeder said.

Career Advancement

Career advancement is another problem, Schraeder continued. "On paper, the state provides for an upward progression for programmers and everyone else" but, in reality, such steady advancement is rare, he said.

Another problem is the case of team project leaders who complete a project and are then relegated to a maintenance function at a lower salary.

Pay and fringe benefits are already good and shouldn't be a problem, Schraeder stated. Neither should job security cause trouble, provided an Illinois DPer is willing to accept the downward mobility that can occur with the come and go of projects, he said.

Schraeder said unionizing DPers requires that the union learn about the industry, but also involves educating white collar people on the advantages their $72/year membership can bring them.

"Whether they like it or not, they have collective bargaining," he said.

The governor's policy "is an executive order, and like any other it is something that must be done," said Douglas F. Benn, who is manager of the Division of Information Systems in the Department of Mental Health and Developmental Disabilities.

Unionization, a concern to him and his fellow managers, adds a new dimension to their work, Benn said. He is also chairman of the personnel committee of the state's Data Processing Advisory Board, which represents the management of 21 departmental DP centers.

"We treat these folks as professionals," Benn stated, adding that Illinois DPers use the latest techniques.

As he sees it, Illinois DPers "have career ladders now," and "when you complete five projects, you don't begin five more to keep your project leaders occupied."

Firm Finds Formula for Success

(Continued from Page 1)
available to anyone else even if all the space wasn't in use. The profile Pratt & Whitney chose, in any case, "is our answer and not necessarily the right answer," he added.

More pertinent, he said, is the fact that management "wants more than 18 raw numbers." To show utilization in terms management would appreciate, Murray weighted the profile percentages by the relative cost of the component and by the relative cost of each of the three systems then in place.

The total figure extracted from this computation is the percentage of total cost actually utilized during the reporting period. The objective is to attain a higher figure for each succeeding period, and presumably the goal can be 100%, since these are relative to the practical limits for each component, Murray said.

On the technician's level, he added, the group uses a variety of software packages as well as three small hardware monitors from Tesdata. Value Computing's Comput-a-Charge is used for calculating user charges from SMF data. Meanwhile, Comress' Alert allows performance analysis of the same data.

Boole & Babbage's Configuration Utilization Evaluator (CUE) is used along with the Tesdata equipment and a disk mapping program for basic diagnostics; Comress' Scert is used for simulation of proposed system changes.

The changes are still taking place, he noted, but already include the dropping of five channels and both drums from the 168. The 165 is just now being replaced by a 3M-byte 158 with five channels, and the original 158 has been expanded to 2M bytes of main storage and five channels, along with one of the 2305 drums from the 168.

Tapes have been reduced to 56, and the 2314-type disks have dropped to 16. But the 3330 spindles have been increased by 10, to 62.

Overall, the hardware budget has been cut back about 30%, Murray said.

Response time has increased with the new configuration, he admitted, but the increase is from .7 seconds to .9 seconds "so it's still within reason."

Outgoing Afips Head To Speak at Caravan

SAN FRANCISCO – George Glaser, outgoing president of the American Federation of Information Processing Societies (Afips), will address the opening day luncheon during the Computer Caravan here (May 6–8).

Glaser's speech comes during the final preparation for the National Computer Conference (NCC), to be held in Anaheim May 19-22; he will also be the featured luncheon speaker at the annual convention of the Data Processing Management Association, the newest member society in Afips.

Glaser's speech is expected to pinpoint some areas of concern for DP management on which he has been outspoken during his two-year term in office.

Glaser has been critical of an alleged shortage of management and programming talent because of inadequate course offerings in colleges and universities.

Keynoting last year's NCC, Glaser charged that new technical specialties "are emerging at a rate threatening the ability of our educational institutions – and our vendors – to train those who would understand and apply them."

The Caravan is in Seattle this week and will conclude its nine-city tour at the Hyatt Regency in Embarcadero Center.

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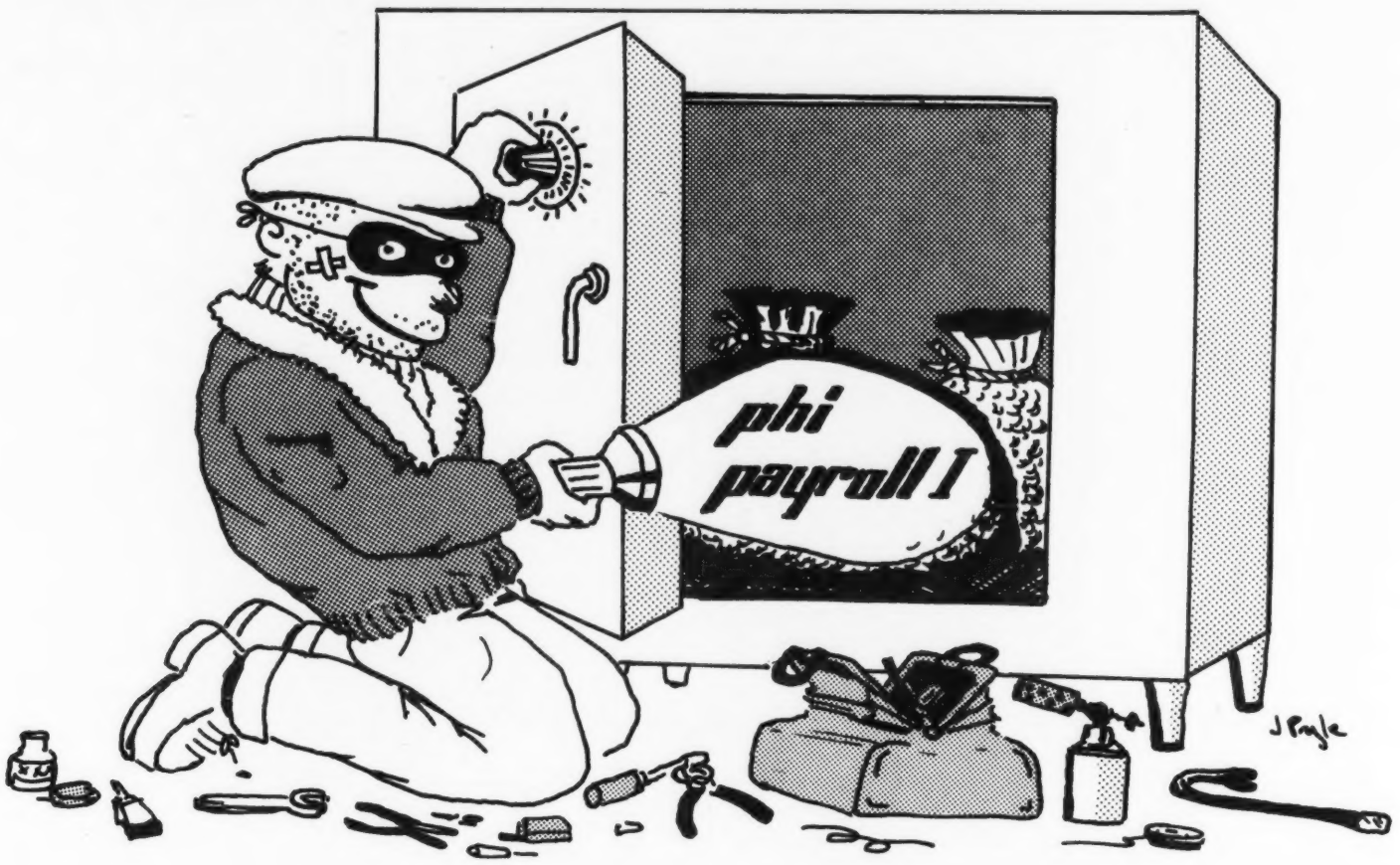

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Utility to Link Future Retailers With Banking's Power

NEW ORLEANS – The retailer of the future will utilize the banking industry's computer power and communications networks through the use of a computer utility. This was the prediction of Edward A. Strobin, consultant, at an Interface '75 session dealing with future aspects of electronic funds transfer systems (EFTS).

The utility will provide retailers with management and operating reports as well as handling credit card, debit card and check authorizations. It will eliminate many clerical functions and back office costs in the retail industry, Strobin said.

The utility will transfer charges to the credit provider and deposits to the retailer's account. It will eliminate cash payments at the point of sale by transferring funds from the consumer's checking or savings account to the retailer account.

In addition, the utility will allow payment of the retailer's bills at the proper time to conserve cash and take advantage of discount terms, Strobin, a staff member with Kurt Salmon Associates, told attendees.

Negative Aspects

Despite this optimistic outlook, there are still some negative aspects of bank cards as seen by retailers. The foremost is that the retailer will lose his unique identity with the customer if his name is removed from the in-house credit card in favor of a bank-issued card.

The merchandiser could also lose control over credit authorization, returns of merchandise purchased on credit and sales to customers who are not carrying their bank cards. There is also a potential danger that credit limits on bank cards may hinder the customer's ability to purchase large items.

This is because total credit availability could be reduced if multiple cards held by the customer, each with a separate credit limit, were replaced with one all-encompassing bank card.

One of the best ways to overcome the negative effects is with a "private label credit card" financed and serviced by a bank, Strobin said. This would allow the retailer to maintain his identity with the customer and his own authorization standards on credit.

One of the problems holding up a universal system is the lack of all-purpose automatic reading devices for attachment to point-of-sale (POS) terminals. A standard will have to be developed, he said.

Privacy Act Rapped for Applying One Standard to Many Situations

(Continued from Page 1)

search warrants . . . are engaged in a fishing expedition at the expense of the individual's right of privacy," he said.

Taking issue with the idea that business is abusing the privacy of individuals was H.D. Arnold, director of public relations for the Retail Credit Co.

"There is no indication of which we are aware that there is a strong consumer movement requesting or seeking further legislation to control information practices of private business," Arnold said.

Amendments to the Fair Credit Reporting Act (FCRA) or further restrictions on consumer reporting agencies are not necessary, he claimed. Consumer reporting agencies have implemented procedures to adhere to the FCRA to the general satisfaction of the consumer.

"We believe the general public has little concern for the 'privacy issue' as it relates to the private business," he said.

"We do need legislation" in the privacy area, Stanley J. Aronoff, a member of the Ohio State Senate, told the attendees.

Among the unfair practices associated with the gathering of data, he listed the accumulation of too much data, the gathering of unnecessary data and the use of data for reasons other than it was originally intended.

There sould be no secret records and no cross uses of data without the subject's consent. Further, there should be a code of fair practices for information record-keeping, he said.

Many of these principles have been incorporated into a bill which Aronoff has introduced in Ohio and which has a good chance of being passed in the legislature this year, he predicted.

Rodino Erases Tapes To Protect Citizens

WASHINGTON, D.C. – Two tape reels containing the names and addresses of Americans who wrote to the House Judiciary Committee during last summer's impeachment hearings were ordered erased by Rep. Peter W. Rodino Jr. (D-N.J.), chairman of the committee.

The tapes could have been "a real prize for direct mail fund raisers," a spokesman for Rodino said. They would have been the "best issue list going, and we would have been under tremendous pressure for them."

One tape contained the names of 750,000 Americans who wrote to the committee favoring impeachment and the second contained the names of 150,000 who opposed it. The tapes were destroyed to prevent the individuals listed on the tapes from becoming subject to political mailings.

The names originally were placed on computer tape to enable Rodino to answer every person who wrote to the committee during the hearings.

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Mass. Preparing to Provide Alternative to SS Number

By Nancy French
Of the CW Staff

BOSTON – Officials of the Massachusetts Registry of Motor Vehicles are developing procedures to comply with Gov. Michael Dukakis' order for a moratorium on the use of the Social Security number as the driver's license number [CW, March 19].

Dukakis ordered the registry to provide alternate numbers for all drivers after State Attorney General Francis X. Bellotti ruled that to require drivers to disclose their Social Security numbers to obtain a license was a violation of the Privacy Act of 1974.

The state already had an alternative numbering system used for people such as aliens who do not qualify for Social Security numbers, according to Joseph Mahoney, director of the registry's computer center.

That number is also a random nine-digit code consisting of the letter "s" and followed by a series of eight numbers to assure a registry-assigned number does not inadvertently duplicate a number assigned by the Social Security Administration. Both can be used on the same system.

Registry officials initially estimated that anywhere from 10% to 80% of the state's 3 million drivers would elect to change their numbers. Mahoney said the first day the ruling appeared in the local newspapers "the phones were bouncing off the desks."

To date, however, only about 100 people actually have requested new numbers.

For the registry, the change will cause a file maintenance problem, Mahoney said.

In addition to the work of providing new numbers for drivers who request them, the registry will have to change each number on its disk file, accessible by name as well as Social Security number.

The disk file, which also contains the driver's address, does not include the person's driving record. That information is maintained in a separate manual file which also will have to be changed, he explained.

Analyst Bill Waite is "making a few alterations in the license update program to permit the number swap and expects it to be fully operational soon.

According to present plans, license update information will be processed against the master file once a week, Waite explained.

The system is being modified so that when the new number comes in for processing, it can be matched against the master file coded with the old number. At the same time, the numbers will be swapped, and the new number will be written over the old number in the same field of the disk record.

The registry maintains a Control Data Corp. 3300 on-line system to serve its own needs, as well as those of state law enforcement agencies.

At Kansas University

Vending Machines Join War to Combat Card Costs

By Catherine Arnst
Of the CW Staff

LAWRENCE, Kan. – A conservation-minded Kansas University computer center is fighting student waste and rising paper costs with an unusual weapon – vending machines.

When the center discovered it had exhausted its 1974-75 budget for computer cards with two months still left in the school year, it decided to install vending machines to dispense the cards to students. Previously free of charge and available in unlimited quantities, they now cost 35 cents per hundred.

Paul Wolfe, coordinator of the computer center, cited a 20% increase in the number of students using the computer facilities and a 75% increase in the price of cards as the main reasons the $13,000 allocated for this year was used up so quickly.

"At the beginning of this year, we were paying $1.01 per thousand cards. Now we pay $1.75 for the same number," he said.

On top of this, the cards were freely available to students, creating a tendency to waste them. "We've had very little control over who used the cards," Wolfe complained. "They were in the open bins, available for anyone who needed them for a computer program.

"The cards are a convenient size for book marks, review notes and the like. Some of the cards have been used for purposes other than preparing data."

Wolfe feels that, by buying the cards, students will be more conscientious of how they are used, and the price should not be a heavy financial burden.

The vending service is under contract to the Kansas University Student Union, with the machines supplied by Vendo Co. It is still considered to be in the experimental stage, but if it is successful it will be continued next year, Wolfe said.

He believes the practice of using vending machines for selling computer cards is common at large universities.

370 Shops Run DOS Longer

(Continued from Page 1)

by the 370 installations, along with the logical support built into both "real" DOS and DOS/VS, to drive more partitions.

Typically the 360 shop used either one or three partitions, with 10 of the installations (some 23% of the sample) organized around one partition and 18 (about 42%) using three. Twenty-four of the 370 shops (38% of that sample) have three partitions, but 10 (16%) have four and another 26 (over 41%) have five.

Disk systems range in size and complexity about as expected, but the extent of double-density units in place with 360/30s and 40s might surprise some observers. More than half the Model 40 installations have the super disks, a figure which also showed up noticeably on 370/135 configurations.

Software Aspects

The software aspects of the survey results showed users counting on Cobol and BAL or Cobol, RPG and BAL far more than any other combination of languages, accounting for some 58% of all the shops. Cobol, Fortran and BAL or BAL by itself were the choice of another 17% of the surveyed shops.

The users clearly endorsed the concept of spooling output for a slow device to intermediate high-speed storage; 81 of the 106 shops have spooling capability in place. Fifty-one percent of all users have Power or Power/VS in place. Software Design's Grasp counts 17 users from the sample.

Source program library support was even more highly accepted with 93 out of the 106 using such capabilities. IBM's Source Statement Library Facility is used by 41 shops, but Pansophic Systems' Panvalet isn't far behind, with 32 installations.

Support for the dumping and restoring of disk files was a concern for 92 of the shops surveyed and, although 30 said they use the DOS/VS Fastcopy utility, another 36 have Westinghouse Electric's Dump/Restore program in place.

Emulation appears to be fading, although nearly 25% of the surveyed group admitted to some use of this approach to running "foreign" programs.

Latin America Seeks DP Teachers

MEDFORD, Mass. – Interested in teaching computer science in Latin America?

In response to requests from Latin American universities for teaching assistance in computer science, the Latin American Teaching Fellowships (LATF) program of the Fletcher School of Law and Diplomacy at Tufts University has created a special program to place people in computer departments and centers in Brazil, Colombia, Peru, Venezuela, Mexico and Central America.

Designed particularly for computer professionals in the middle of their industrial or educational careers, the program's administration is funded through a grant from IBM World Trade Corp., and participants are financed by the host universities and cooperating corporations, Susanne Tiktin, director of special projects for LATF, said.

She noted individuals selected for participation in the program will generally teach full time, in most cases for a period of two years.

But some will have opportunities to undertake special consulting activities and/or operational responsibilities with local corporations, Tiktin added. Such corporate assignments, referred to as "internships," will also be educationally oriented.

Recent recipients of Ph.D. degrees in computer science or a related field, Ph.D. candidates with experience and faculty members are urged to apply for the program, she said. Applicants should be available for no less than one-year posts in Latin America and should have some proficiency in Spanish or Portuguese or a willingness to learn one of these languages.

Financial arrangements will depend on assignment location, Tiktin noted, but in most cases, will range from a stipend of $750/mo to $1,500/mo.

As with other LATF programs, age and citizenship are not a problem and, while prior teaching experience is desirable, it is not mandatory.

While LATF would like to fill 20 positions in computer science by July, she said selection for the program will continue all year round on an ad hoc basis. Those interested in participating in the program can obtain further information by writing to Tiktin here at Tufts University, 02155.

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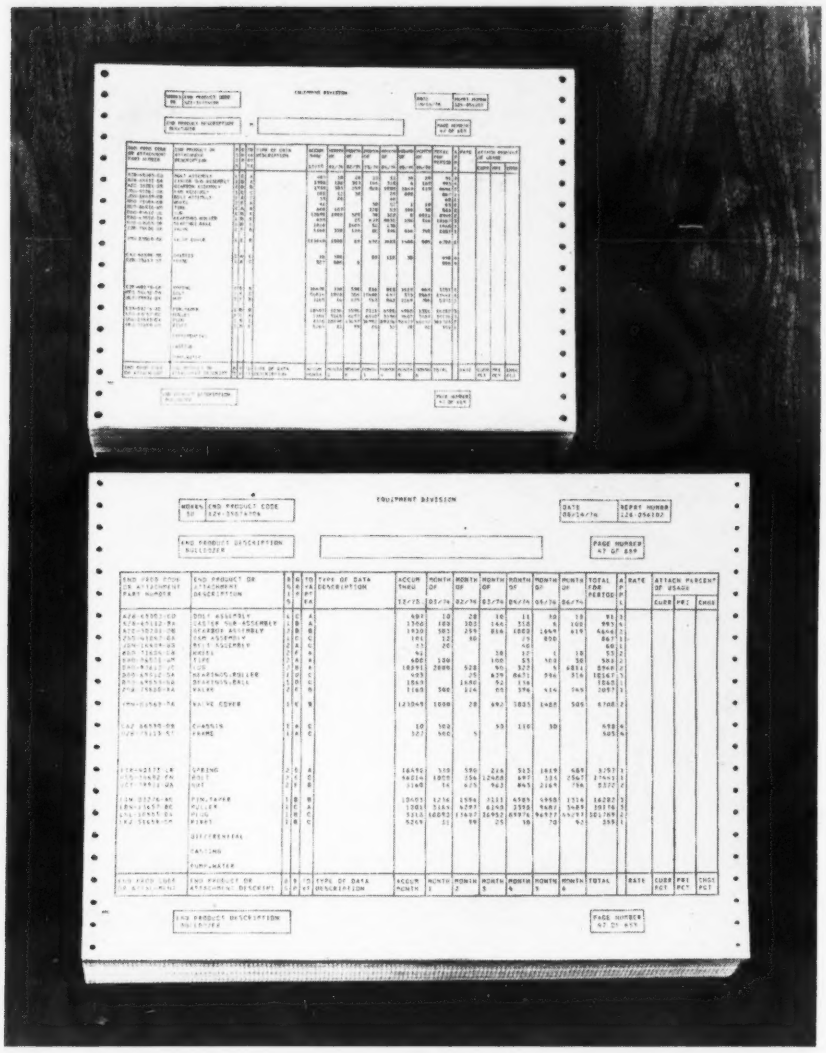
Gulf

New IBM printer uses advanced technology to streamline computer output and reduce costs.



The new 11 x 8½" printout size offers convenience and cost savings compared with the unwieldy 14⅞ x 11" printout.

The efficiency with which a printer records the results of data processing helps determine the efficiency of an entire computer system. Now IBM announces the 3800 Printing Subsystem which can revolutionize the entire printout process.

Linked to a System/370 virtual storage computer, the 3800 is based on a new principle of non-impact printing. In place of the familiar method, which makes printed characters by striking a ribbon against paper, the 3800 uses

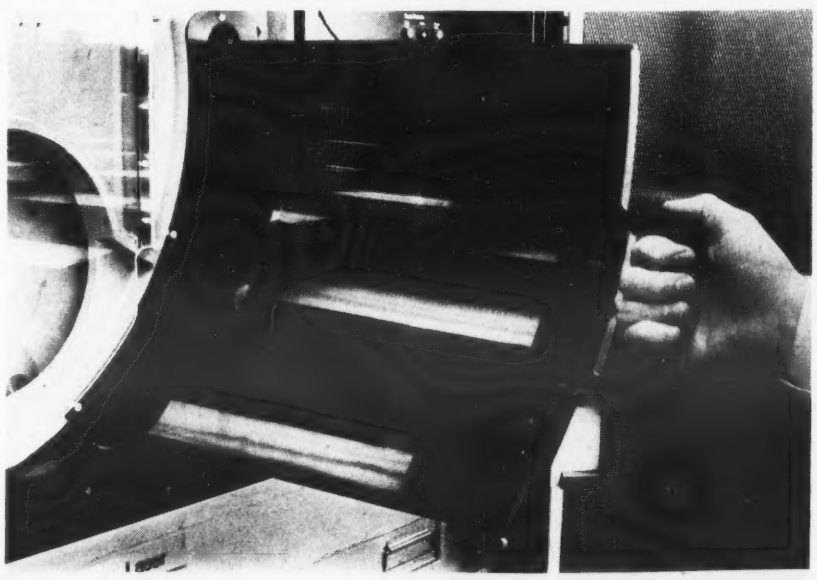
Single-copy speeds can be as high as 13,360 lines per minute.

laser and electrophotographic technology to create printed images.

The immediate result is quality printing with exceptionally high contrast and clarity. But that's not all.

Single-copy speeds can be as high as 13,360 lines per minute—*six times faster* than the fastest IBM printer now in use.

Since the 3800 employs non-impact printing technology, carbon copies are not made—which can result in a savings of from 25% to



To create a business form on plain paper, an overlay is inserted in the 3800.

nearly 50% of current form costs. When a duplicate copy is needed, the material is simply printed again at extremely high speed. The effective line-per-minute rate is reduced, but all copies are equally sharp from first to last.

At least 25% savings on current form costs possible.

And with carbon paper entirely eliminated, there is no time-consuming removal and disposal of carbon paper after use.

Using plain paper, the 3800 can create both the business form and its content *simultaneously.* This is done by inserting an overlay of the desired form in the 3800. The form as well as its content are then transferred onto the paper. By so doing, the expense of preprinted business forms can be greatly reduced. There is virtually no need for machine setup time for changing from one form to another.

Equally important, the 3800 has the flexibility to accommodate preprinted business forms in any of 50 common sizes.

```
THIS IS 10 CHARACTERS PER INCH PRINTING.
THIS IS 12 CHARACTERS PER INCH PRINTING.
THIS IS 15 CHARACTERS PER INCH PRINTING.
```

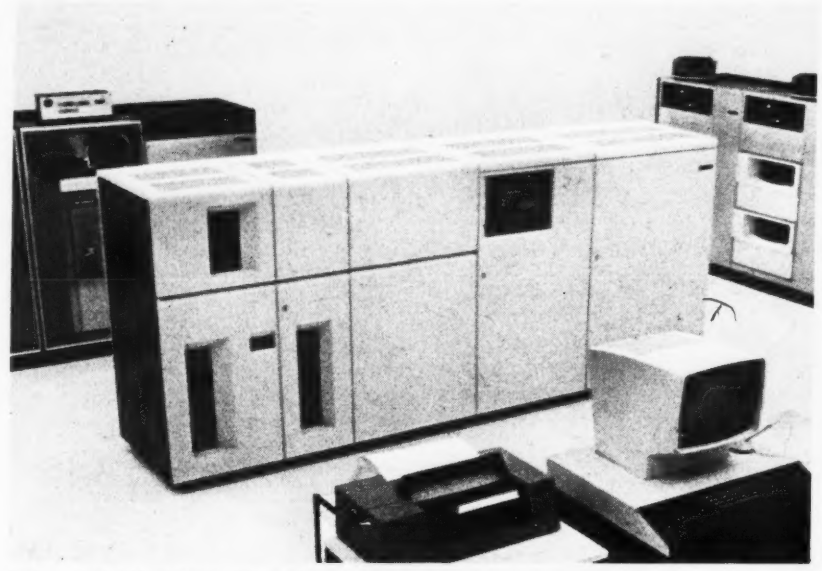
Three print sizes—10, 12 and 15 characters per inch—are standard with the 3800. The multiple sizes can be intermixed in a single form. All printing is done in a one-step process, under direct computer control.

Use of the 15 character size allows you to print the same amount of information on 11 x 8½" paper that would normally fill standard 14⅞ x 11" computer printout sheets. The convenient 11 x 8½" forms fit in files and briefcases just like regular correspondence, ending the handling of awkward, oversized computer reports.

The smaller size also cuts down on current forms costs by at least 25%—a substantial savings in the light of increased paper costs.

The 3800 can even individually address each copy of each report, to help speed it to its destination.

The 3800 offers improved data security. For example, confidential sections of a report may be withheld from selected copies on a "need to know" basis. And, of course, there is no carbon paper to worry about destroying.



The IBM 3800 Printing Subsystem employs laser and electrophotographic technology.

Through the use of the 3800, you can lower your total cost of printing. It can do your systems printing job—not just parts of it. This means, for example, that it can replace any off-line units you might be using to increase your overall printing capacity. And it can do it all while cutting costs through smaller size forms and the elimination of carbon paper.

IBM can help you evaluate cost savings and system advantages of the 3800 in comparison with your current impact printers. For further information, including cost comparisons as well as descriptive material and print samples, consult your local IBM Data Processing Division office. Or write IBM Corporation, Dept. 83F-CW, 1133 Westchester Avenue, White Plains, N.Y. 10604.

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New Hampshire Bill Would Keep Credit Files In-State

By Edith Holmes
Of the CW Staff

NASHUA, N.H. – Credit reporting agencies, legislators and consumers here and throughout the state have debated and are now waiting to hear the report of a state senate committee on the merits of a proposed bill which would prevent the use of out-of-state computer services for storing the credit files of New Hampshire residents.

The committee held hearings on Senate Bill 98 (SB-98) at the beginning of this month.

Designed to amend the state's Fair Credit Reporting Act to require a consumer reporting agency to store its files within the state, SB-98 is supported by many on the basis that without it, the trend toward reliance on service bureaus outside the state will make enforcement of individual privacy rights next to impossible.

Those opposed to the bill, however, contend present laws adequately safeguard the use of out-of-state agencies for storing credit files. They suggest the real impetus for the bill stems from the fear that large service bureaus coming into the state will eventually swallow up small credit reporting agencies.

First Such Law Proposed

Introduced by four New Hampshire senators and supported by Gov. Meldrim Thomson, the proposed statute is the first law addressing the issue of out-of-state, centralized consumer credit computer banks to be put before a state legislature in the nation.

While he is convinced that only two credit data banks will someday serve the entire country, Wesley C. Pike, owner of the Credit Bureau of Nashua and chief proponent of SB-98, argued such legislation is intended primarily "to regulate the consumer credit reporting industry for the protection of New Hampshire consumers."

He is particularly concerned that credit files on New Hampshire consumers remain under the jurisdiction of the state's laws.

"Once a consumer credit file is no longer maintained and stored within the state, the consumer will be unable to deal locally with the reporting agency which may be furnishing an erroneous report.

The consumer will be unable to enforce his rights in the courts of New Hampshire. The consumer will be unable to obtain an effective response to his complaints from the State Attorney General's Office since the reporting agency will not be within the jurisdiction of the New Hampshire courts," Pike warned.

Charging that large credit agencies like TRW Credit Data and Trans Union Systems, Inc. "don't give a damn about the consumer or his file or his privacy," Pike suggested in-state computers as a solution to the reporting speed these firms offer. His own bureau is in the process of installing a mainframe now.

But another agency owner, Ralph Locke, whose Manchester Credit Bureau Group has for the past year been converting to a computer filing system with Chicago-based Trans Union, defended the use of an outside service bureau.

"When you use a service computer, you own and control your own file. Under the Fair Credit Reporting Act, the only people who can receive the information are those who have signed a contract with me. They have a personally assigned access code which I control, and I can change it within an hour if there is any fraud," Locke said.

He added that the consumer always has access to his file through a terminal located in the local credit reporting agency's offices and noted the potential for fraud exists regardless of the type or location of the system used. "The only difference between my operation and Pike's is the length of the telephone lines," he said.

Would Prevent Efficiency

The New Hampshire Bankers Association has voted against supporting SB-98 "because it would stop the advance of efficiency in trying to do business," according to John Perley, chairman of the legislative committee of the association.

"What is important is what is contained in a credit data file, and Lord knows we have enough legislation on that," Perley said.

In reference to Pike's charges that Locke influenced the association's decision not to support the bill and that his service bureau will eventually be absorbed by Trans Union, he added, "to scare people with the issue of state boundaries as an anticompetitive device is ridiculous."

A lawyer with the Consumer Protection Division of the New Hampshire Attorney General's Office, Richard Wiebusch, said the Attorney General hasn't taken a position on the bill and won't.

"In examining SB-98, our office decided that 'no comment' was the best course to take on this particular measure," he said.

Accordingly, Wiebusch couldn't say whether privacy considerations or competitive measures were the key motivation behind the bill.

Speaking for William Gibson, Boston office director of the Federal Trade Commission, Attorney Mark Compras said Gibson supported the privacy principles involved, but felt the bill falls short of providing that kind of protection.

He added that Gibson suspected it might be impossible for a state to pass such a law and that such issues would best be handled at the federal level.

But Pike contended that "by the time federal legislation is passed, most of the credit bureaus they hope to save will have been driven out of business by the national credit reporting companies."

He also asked New Hampshire citizens: "Do we want to relinquish our control of the consumer credit reporting industry to the Federal Government or to New Hampshire to retain some control over its own destiny?"

While TRW has never marketed its services in New Hampshire, Donald Badders, director of state government relations for the firm, commented on the interest of national credit agencies in acquiring smaller reporting bureaus.

"Certainly, the small bureau in a big city is going to have problems with companies like ours," he said. "But in a town or city with 50,000 people or less, the volume of credit files simply isn't there to support the costs of computerizing them. Just as there is a need for the corner grocery store, there is also a need for the small credit reporting agency," he said.

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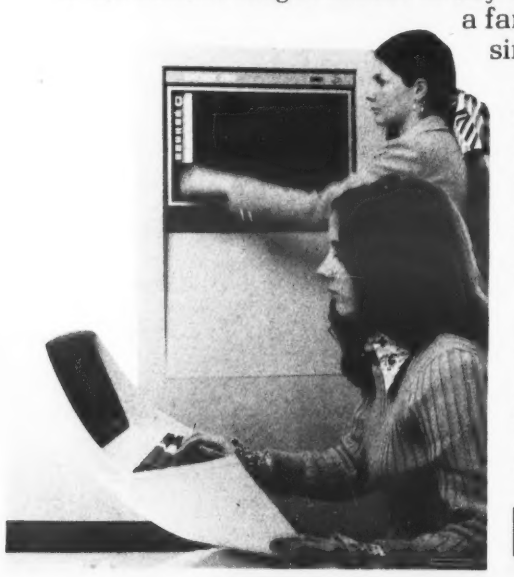

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However, since your 3270's don't have blinking, lower case, graphics (or most other special 980A features, we might add), applications software developed to support the 3270 won't support our 980A. So we don't think we'll be replacing many of your 3270's.

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Editorials

Too Soon to Quit . . .

To many people, the passage of the Privacy Act of 1974 was the end of the struggle to regulate the use of personal information contained in computerized data banks.

It is not the end, however, but rather the beginning of a long road that may eventually end in effective regulation of all such data banks.

And all people in DP should supply input to the policymakers so future regulations will be well thought out and workable in the real world.

The Privacy Act establishes a commission to study possible extensions of the provisions of the bill into the private sector and ways to strengthen the provisions of the law.

The act is limited to federal data systems, and compromises made to get it passed limit its effectiveness even in that area.

This commission will not be able to do its work effectively without a great deal of input from the DP community outlining feasible solutions to the problem.

No one should believe there will not be regulations on private data banks, because it is a certainty such regulations will be passed by Congress before the end of the decade and possibly within two years.

Therefore, both people opposed to the extension of the privacy regulations and those in favor should make their views known to the commission and to their representatives in Congress.

The commission can be reached through either Rep. Barry Goldwater Jr. (R-Calif.) or Rep. Edward Koch (D-N.Y.), who are both members and congressional advocates of further privacy safeguards.

The problem of privacy that is created by placing ever-increasing amounts of personal information in data banks has not been solved by the Privacy Act of 1974 and will not go away.

DPers must become involved. Do it today.

A Case in Point

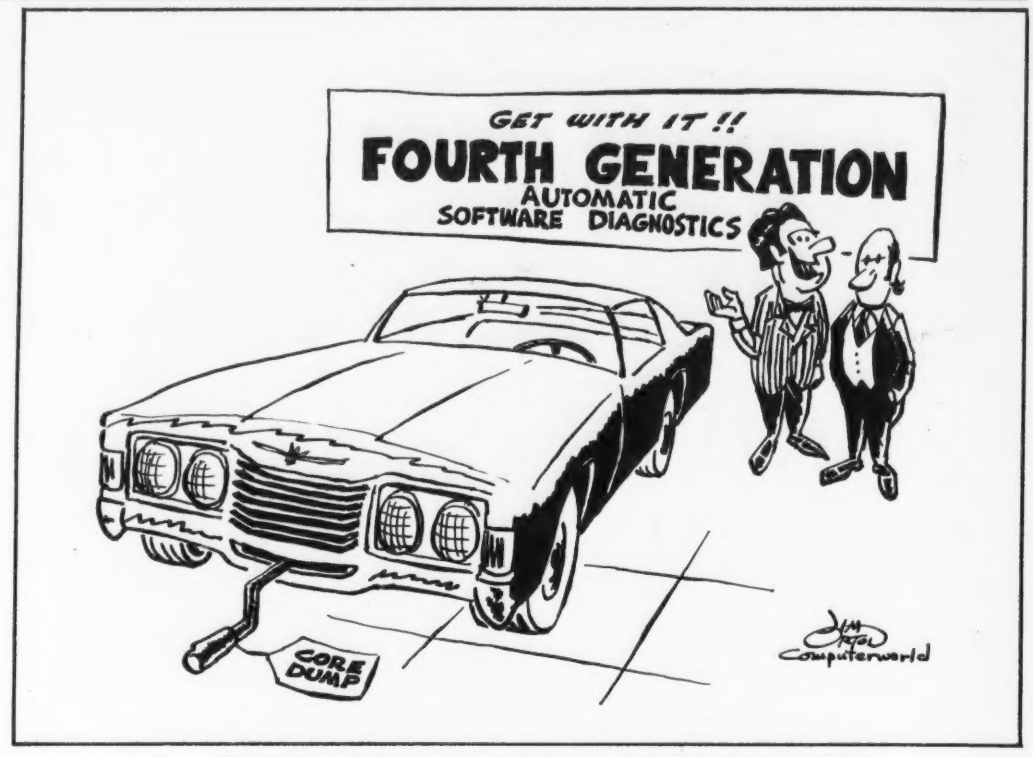
Opening the Internal Revenue Service and Social Security Administration files to states attempting to locate "runaway parents" [CW, Apr. 23] clearly raises privacy considerations, and safeguards should be instituted immediately to prevent possible abuses.

Luckily, President Ford and others in the Administration recognize the danger of uncontrolled and untraceable access to such files as allowed in the recently enacted legislation that opened the files to the states.

But they must act quickly to provide the necessary safeguards before abuses occur.

New legislation should ensure that information will be sought only after a court order has been issued for a parent that has left a fmily without support in violation of a court settlement.

In addition, it should provide for very clear audit trails so that anyone requesting such sensitive information can be identified later.



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Letters to the Editor

Multiple Deficiencies Make PL/I a 'Software Dinosaur'

As Lois Frampton and the American National Standards Institute (Ansi) X3J1 Committee are surely aware, there are some deficiencies with PL/I ["Ansi Solicits User Input on PL/I Standard," CW, April 9].

It is deficient in control structures, data structures, extensible data types, conciseness of syntactic and semantic definition, desirable syntactic redundancy and restrictions on the use of GOTOs, printer and label variables and automatic type conversions.

It is immodestly complex, poorly defined, difficult to learn and difficult to implement. It makes everything possible at the cost of making everything inefficient and needlessly complex. PL/I is a software dinosaur.

Both its incompleteness and its complexity will encourage incompatible implementations as is currently typical of "standard" Fortran.

Good implementation languages are characterized by their compilers which are written in the languages themselves (vs. IBM's PL/I written in Assembler), fast (single pass vs. three pass for IBM's PL/I), efficient in the use of both human and machine resources (approximately 10K lines of code vs. 750K for IBM's Level F compiler) and multiuser reentrant.

One could hardly expect a hardware vendor in 1964 to propose an efficient, modest, transportable software system. This antiquated language's only redeeming quality is its modest superiority over Fortran and Cobol.

Richard J. Cichelli

Allentown, Pa.

No Need for a 'War Council'; ICCP Already Provides Forum

In response to the article "Lord Ready to Powwow" in the April 9 issue, one must ask if Ken Lord's left hand knows what his right hand is doing.

So now Lord is calling a "war council" on "licensing" and "social implications." Certainly no one can fault him for calling much-needed attention to these issues.

In the same vein, popular myth holds that Nero called much-needed attention to slum housing in Rome by burning much of the Imperial City to the ground.

Does Lord know what he is fiddling with? He and the Society of Certified Data Processors (SCDP) supposedly support the Institute for the Certification of Computer Professionals (ICCP), yet they continually ignore this already formed forum, both in the recent state licensing proposal and now in calling some kind of a war council of professional societies. With whom is Lord at war?

Those of us who are looking for a reasonable solution to the issue of licensing and who are working to better understand "social implications of the systems we use" wish Lord would pull his head out of ––, slow down and let some sense catch up with him.

Jim Brown

Justice, Ill.

Licensing May Be Anticompetitive

It suddenly hit me that if DP people were to be licensed they could do all sorts of things, such as establish uniform rate structures, force people out of the business who undercut prices by calling them "unprofessional," prevent new people from entering the field through the licensing exams and/or minimum experience requirements and, in general, act like doctors and lawyers.

While this may be attractive to some people, it is not to me. Jack Anderson was right when he pointed out the common man is being screwed by the lawyer who charges $100 to read over a will or do a title search but would get thrown out of the bar for doing it at a fee closer to his real cost.

Heaven help us if the profession goes that route. There must be better ways to protect the public against bad systems and programs than to use a method that will prevent competition at a future time.

J.M. Thomas

Las Cruces, N.M.

System/32 Not First Simple Unit

In the article, "System/32 Expected to Increase Independent Sales" [CW, April 16], I read with interest the statements put forth by David E. Ferguson. I take issue with his premise that "the System/32 is the first machine to bring DP to users with no computer training."

The Burroughs Corp., utilizing the experience gained in the installation of over 100,000 keyboard-oriented accounting computers throughout the world, developed the B700. This disk-based system, released in March 1973, is specifically directed at users with little or no DP experience.

I believe a close examination of operating procedures on the B700 and IBM's System/32 would prove Ferguson's statement to be incorrect.

The simplicity of the B700 allows it, like the System/32, to be treated by a user more like his Xerox copier, or even his IBM Copier II, than a computer in a traditional sense.

Stephen B. Maddox
Selected Accounts Representative
Burroughs Corp.
Burlingame, Calif.

Letters to the Editor

Evaluate Noise Level Of CPUs, Printers

Bob Brown's article on evaluation characteristics for CRTs and printers [CW, April 9] seemed to have overlooked what has been going on in the "Letters to the Editor" section.

The problems Ohio University has been having with "whining" terminals should lead to an inclusion of noise level in evaluating any CRT or printer.

Another characteristic that should be considered is whether a lack of noise could cause problems. Some manufacturers of word processing equipment have had to add "clicks" to their CRT keyboards to improve operator efficiency.

Noise level could and should be one of the determining factors when purchasing a CRT or printer.

Richard M. McLaughlin
Fullerton, Calif.

POS a Step Forward

I'd like to add my two bits to the controversy on point-of-sale (POS) systems in supermarkets.

I have been buying food for a couple of years, and I have yet to find a supermarket that price marked its stock consistently and legibly.

In my opinion, marking the prices on the shelves would be a step forward.

Jonathan Sachs
Chicago, Ill.

Programming an Art

Certainly there are generalizations which can be made about good, legible coding, but in the end it is artistic sense, rather than technical expertise, which dictates clean logic, structuring, care in the use of compounding and all those other things which make up the total program package.

What the programmer must search for is not "GO TO" less code, but elegance of form in the medium of logic.

If that can be achieved, the program will not only work, but also will be easy to maintain.

Surely none of us is a Picasso or an Einstein. But, for most of us, there is no reason we cannot be competent commercial artists if each of us practices, experiments and tries his best to make each program a masterpiece of elegant simplicity.

Guy B. Chase Jr.
St. Paul, Minn.

'U.S. Snail' Slow

It was not without amusement that I read your advertisement in the March 26 issue of *Computerworld*: "Get the news when it happens, not when it happens to get to you."

Ironically, that issue arrived only yesterday, one day after the April 9 issue arrived.

Honestly, isn't there something that can be done about the U.S. mail system? In an industry like this, one or two day's delay can be very costly. I would like to hear of other people's experience with what is slowly becoming known as the "U.S. Snail."

Don Weimer
Babylon, N.Y.

Replacing the UID

Now that Congress is preparing to explode our fond dream of the effortless universal identifier (UID), we should be planning actively for the next generation of account-identifier methods.

To stimulate debate, here are some alternatives:

- Everybody grow their own again, like we did in the good old magnetic tape days. People won't use such multitudinous arbitrary numbers – or, worse yet, they will misremember and garble them. And the new "challenge" laws mean that misposting will not be so cheaply corrected this time around.
- Force-feed another existing identifier up to UID status – like maybe state driver's license numbers. But are you ready to code fifty distinct validation routines? What about people who don't drive? And what if some states follow the federal initiative by outlawing UID use of state identification numbers? And what if people move?
- Construct composite identifiers from familiar data such as Zip/address/name/birthdate.
- Ask the customer what number he would like to use to communicate with you. This sounds chaotic – subversive – democratic?!! But consider: we have told our customers "this is *your* account number" when it wasn't – it was *our* number for keeping track of *our* records of the customer's account.

One major implication of all these methods (except the primitive home-grown method) is that the process of changing an account-number must become much simpler in future systems. Direct-access files with multiple keys should make this easy. Tape-file changes can be rolled forward to the next update cycle.

Robert Higgins
West Chester, Pa.

Technical Publication

Our trade is divided in many ways: experienced and novice, business and engineering, major and mini. Men and women, too – thank heaven, as Maurice Chevalier used to say! One of the more difficult divisions concerns technical papers. On the one hand we have our academic brethren, who write profusely. Sometimes repetitively, sometimes in jargon, sometimes without much content – but always with the full apparatus of references and referees. And on the other hand there are the silent installations, where tough problems abound but no guidance for others is recorded. Talk at the local DPMA chapter meeting, sure; advice within the parent corporation, perhaps. But nothing for the wider community.

The reasons for the difference are clear: the professors benefit from publication, in the esteem of their peers and in terms of promotion. Other peoples' papers can be used to pad out one's own citations and footnotes and bibliographies. There is a praiseworthy urge to read the latest advance, to discuss at next week's seminar, to try out new algorithms. But for the business data processor or the engineering computer specialist, publication is often contraindicated. The boss thinks it a waste of time or even giving away of commercial advantage. The peer group is less vocal. There are no eager disciples, no subservient thesis grubbers.

Yet the nonpublishers *do* want more than they get. The DPMA and ASM journals are thin, the articles too narrow or too broad, the authors often clumsy and lacking references and follow-on material. The ACM and IEEE journals are full of computer science: artificial intelligence, peculiar languages like Algol, disputes about minutiae. They abound in solutions to problems no one cares about; the business DP magazines list real problems, but provide few answers.

In despair, practitioners with tough problems that need new, powerful techniques go off to Guide or Share or a Univac group. But that's a limited universe, and one pretty much inhabited by only one kind of advice: buy a little more core, add a few more program packages – the builder knows best.

The trade press tries: *Computerworld*, *Datamation* and their ilk. But temporal pressures interfere, and spot news, and advertising. We need something better – a *Scientific American* of computerdom. In my view, the only way to get such a magazine is to have it be the journal that goes to all the members of a 200,000-member North American Computer Society. And we are a long way, alas, from that.

Herb Grosch

Carling a Case in Point

Portions of Licensing Bill Essential to DP Security

The Taylor Report
By
Alan Taylor, CDP

Donald Tuson of the Carling Brewing Co. recently argued that Carling has built fully integrated management systems that have been praised by major accounting and consulting firms without ever employing a holder of the Certificate in Data Processing (CDP) [CW, Feb. 19]. He also said there is no evidence licensing (of data processors) is needed to promote public safety, health or welfare.

At the same time, Charles Schoenian, treasurer/controller of Carling, opposed the idea of licensing on the grounds it is a "hoax" on the business community.

I have no doubt that Carling's own DP is everything Tuson said it is. But that does not mean some form of standards – as provided by the licensing bill – is not needed to protect the public. Tuson is totally wrong if he thinks there is no evidence DP can endanger the innocent public.

To the extent that he regards DP as a trade more equivalent to that of the skilled mechanic rather than to that of the learned professionals, I can see his point.

However, the skilled mechanic is expected to see only the *immediate* consequences of his actions. He is like a butcher, who is not expected to delve deeply into the details of where the meat came from or what could happen to someone eating it. He just deals with the immediate problem of separating flesh from bone, cutting along or across musculature, etc.

A professional, responsible person, understanding the hidden dangers of separating flesh from bone, is something different from a butcher. He, as a surgeon, is nowadays counted among the professionals. Hopefully, DP can provide both for valued, skilled mechanics and for learned professionals.

Carling Data Leak

Perhaps I can help Tuson and Schoenian by showing how such dangers really do occur – and how even large DP operations that have been warned of the dangers will continue to risk other people's interests.

I can make this offer because, since *Computerworld* printed Tuson's comments, details on Carling's own private National Shawmut bank account have reached me – not through any action on my part, but because of the security problems at the bank.

Hopefully, Tuson will now see that his points about the perfection of the Carling installation are beside the point.

The Shawmut Question

The Carling data leak that has occurred since I last wrote on this matter has allowed me to try another test on the realities of the Shawmut Association problem. All I know as I write this is that a leak has occurred. I don't know whether Shawmut knows this or whether there are so many leaks of confidential information it will be unable to identify which documents have reached me.

So, I have just wired the board chairman of Shawmut, telling him the leak has occurred and is being reported to the Government Regulatory Committee of the Massachusetts Legislature to help offset Tuson's statement that there is no evidence regarding dangers to public welfare.

That does not end the question, however. The telegram pointed out that if Shawmut is unable to identify the document and the first possible date on which it could have reached me, it will strongly suggest its security is not only vulnerable, but so poor it simply doesn't know when leaks occur. Frankly, I think this is probably the position it is in.

Undetected Leak Question

This is not just an opinion, but is based upon the fact that when an unnecessary computer printout was alleged to have been destroyed in Shawmut's market analysis department, the departmental manager was unable to think of any way in which she could prove such destruction had taken place.

That, I think, indicated documents are not being watched properly.

But Shawmut may have changed. Or perhaps that case was simply an isolated one. We'll see.

So, Tuson and Schoenian. Here is your evidence DP may need portions of the licensing bill. Hopefully, some time you and the sponsors of licensing will consider sitting down together to find the points on which you agree. That could help us all.

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With Some Vendor Help, VS1 Could Be Superior to MFT

By J.W. Wedding
Special to Computerworld

South Carolina Electric & Gas Co. has been using OS/VS1 since February 1973. This is not because it is a superior operating system to OS/MFT. We do this only for the reasons of obtaining support for new IBM software and hardware products. Our evaluations and experience indicate that the price we are paying (and we are paying a price for the use of VS1) is not too severe.

While our hardware monitor had the ability to measure CPU utilization in both the programming and systems states, we found the most effective, accurate and meaningful measurement was the number of program steps executed.

Reader Commentary

Our final test proved to be most meaningful. It consisted of running one program which was comprised of approximately 12 reels of tape and required approximately one hour runtime. In our opinion, the I/O for this particular program was fairly typical for normal DP work.

We ran this program by itself on an IBM 370/145 under three conditions: OS/MFT, VS1 with V=R, and VS1 with V=V. These jobs were run by themselves with no other region being active.

Memory was of such size that with V=V the program was core-resident and no paging took place. (The program, approximately 120K, was written in Assembler language.)

The table below shows the result of this benchmark.

Operating System	Program Steps Executed*
OS/MFT	100
OS/VS1 (V=R)	110
OS/VS1 (V=V)	168

*Using MFT as a basis of 100%, the number of steps executed is shown as a percentage relative to OS/MFT.

This benchmark clearly showed 68% more instructions are executed running a program under VS than under MFT. This is explained by the amount of CCW translation and instruction necessary to keep the DAT table current. Any paging required by a program would be an addition to this time.

It is also important to note memory costs are continuing to decline while CPU costs are increasing. The ideal situation in a computer system would have all of these assets being fully utilized at all times.

The whole principle of a VS operating system is to conserve or save on memory at the expense of CPU utilization. If the price one had to pay in increased CPU utilization was small, this might be a worthwhile approach. It is our conclusion that to use 68% of the CPU – the most expensive asset – to save on memory is just plain bad economics.

The oft-quoted justification that VS will give greater throughput is simply not true and represents a complete distortion of facts and experience. In any system where the assets are reasonably balanced, it is obvious from our benchmark that VS will lengthen the job execution and job throughput.

VS is often justified also because it uses unused CPU cycles to save on memory. We think a larger memory and a smaller CPU is a more economical approach.

The way we are using VS1 is contrary to the vendor's recommendation. We schedule five regions. Our teleprocessing region (CICS) is running in a V=R region.

We also schedule most major lengthy I/O runs in a V=R region. We have enough memory so that we can normally capture a V=R region rather quickly.

VS1 can be substantially improved and the problem of CCW translation minimized if IBM would only make V=R regions easier to capture. The way the system presently operates, V=R regions have the lowest priority.

We are sure there are numerous other approaches to providing performance regions along with virtual regions. The local IBM organization worked with us and have been kept advised of our results. Failure on the part of IBM to provide these enhancements can only be interpreted as a marketing strategy to sell larger CPUs.

Wedding is vice-president of South Carolina Electric & Gas Co. in Columbia, S.C.

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'Found It by Accident'

Datanetwork Flexibility Replaces In-House NCR 100

By Don Leavitt
Of the CW Staff

ST. PAUL, Minn. – Sometimes users find a way almost by accident of doing things that suit their style and their needs. That, for example, was how Health Services Association (HSA) came to be a subscriber on the Honeywell Datanetwork service, according to Gary W. Clark, HSA's DP manager.

The association is a health maintenance organization (HMO) that started nearly one hundred years ago as The Northern Pacific Beneficial Association to serve the medical needs of the upper Northwest. Today it includes hospitals in Tacoma, Wash.; Missoula, Mont.; and here.

By February 1974, HSA's seven-year-old 32K NCR Century 100 was running three shifts a day and was nearly out of capability to handle accounting records for the hospitals and the nearly 20,000 members of HSA and a newer HMO called Share, Inc. Sorts had to be handled in two stages, Clark explained, and "communication" with Tacoma and Missoula was indirect through off-line transmission of tape images generated here, and the U.S. Mail.

HSA sought proposals for a newer in-house configuration and possibly intelligent terminals, and one of the vendors contacted was Honeywell. A casual mention of the Datanetwork, probably to show the extent of Honeywell support, changed Clark's thinking completely.

Datanetwork is a remote-computing service largely focused on support of users with Honeywell mainframes in-house, including Honeywell itself as a major customer. The service is built around large-scale Honeywell 6000 series systems run under the same GCOS control software users would have on their equipment.

Clark saw that the Honeywell service, including substantial data communications capability maintained by the vendor, would be well suited to HSA's needs. "Flexibility" was the word he repeated several times in describing what he saw as the greatest advantage of going to the network.

The decision to go to the net was made in May 1974, but it took Clark and programmer Sharon Bugge until October to get the first application up and running.

The conversion effort at the very least involved changing all the programs from NCR's Neat/3 – the only language Bugge had ever used – to Cobol. Honeywell offered a Neat/3-Cobol conversion package, but, according to Clark, it really didn't work very well.

So the two association employees took on the chore of rewriting everything themselves. With full-time systems engineering help from Honeywell, they included resystemization where it seemed appropriate.

That effort was a good learning experience, Clark said, but it also had direct economic benefits for the association. The NCR tape encoders and off-line transmission equipment here and in Tacoma were released and the third shift at the local Samaritan Hospital was eliminated.

HSA had some 15 or 20 applications on the Century.

Many of them are in conversion or have been moved to Datanetwork, and Clark expects to release the Century at the end of May.

In place of the NCR mainframe, HSA has a Honeywell 700 remote job entry station linked to the network. Most of the current workload is done in batch mode, though file maintenance and programming changes are made in time-sharing mode through teletypewriters, including one in Bugge's office. Tacoma also has a Honeywell 700, but Missoula is a small enough operation that it can mail its work daily to St. Paul, Clark noted.

The association enters jobs during the day but schedules them for delayed execution in non-prime time. Immediate results are not extremely important in accounting applications, and the acceptance of overnight processing entitles HSA to a 25% discount, the manager said.

Output from the processing is ready in the morning and the HSA operators can call for it anytime they are ready, with the proper forms in the printer attached to the local H700.

The workload covers weekly billings for current work to all inpatients and outpatients at the three hospitals. About 20,000 monthly statements for all accounts with outstanding balances are also produced, as are monthly and quarterly billings to association members, Clark noted.

The system also manages about 60,000 claims yearly for the HSA membership.

The one concern he seemed to have in the generally happy move to the Honeywell net is the thought that costs could get out of hand awfully easily. Immediate access to the system for programming work might encourage more tinkering than it should. But, thus far, it hasn't happened and HSA has found Honeywell's services, including the increased flexibility, costs "just about the same as our in-house system."

Package Retests Flagged 3336 Tracks, Restores the Ones That Can Hold Data

LONG BEACH, Calif. – More than 90% of IBM 3336 disk pack tracks flagged because of data checks can be recovered for normal usage when packs are cleaned regularly and the installation utilizes DASD3336 software from Economic Data Products, Inc., a vendor spokesman claimed.

DASD3336 was developed by Tone Software, Inc. of Santa Ana and includes three basic subroutines.

List, a reporting routine that shows all flagged tracks on a disk pack, can be used to check packs as part of normal preventive maintenance.

The Retrieve subroutine is more complex. It searches a pack for flagged tracks and then tests each such track using – in the vendor's words – a "special, highly critical bit pattern." If the track proves capable of holding data, the flag is removed, and data stored on the alternate track is copied back onto the prime track.

The Format subroutine performs the normal initialization of an entire pack, testing all tracks and flagging those which are unable to hold data.

This independent software has become almost a necessity for users who have switched from 2316 disk systems to 3330s, the vendor said, since IBM-supplied logic for handling 3336 packs is time-consuming and, more important, irreversible.

Automatic Re-try attempts to read a track 23 times; if unsuccessful, a data check occurs and the operator must flag the track and assign an alternative.

Alternative tracks are always located beyond Cylinder 404, which may mean a full-surface seek for that track if, for example, the original track was near the outer edge of the disk.

IBM's coding makes no attempt to check out a track once flagged. So, even if the problem that caused the original bad read was temporary, the bypass and use of the alternative track continues.

DASD3336 operates under OS/MFT or MVT or under OS/VS1 or VS2. The software can be purchased for $1,250 and is available within two weeks after order.

Economic Data Products is at Suite 201, 3520 Long Beach Blvd., 90807.

'Ridam' Runs Retail Store Accounting

WATERTOWN, S.D. – Retail stores with access to systems that support RPG-II can manage many of their accounting applications with a single package developed by and now available from Cook's Office Machines and Service.

Retail Integrated Departmental Accounting Minicomputer (Ridam) includes payroll, receivables, payables and general ledger "subpackages."

The system is built around a fill-in-the-blanks approach to data entry and carries the user-support theme one step further. Transactions need be entered only once, after which the system carries the information to all the appropriate applications.

Control is built into the system, too. All operations which do not have an automatic offsetting entry such as check writing are programmed so the operator cannot complete the document until the postings balance. There is no way – "outside of machine failure or deliberate sabotage" – to get the general ledger accounts out of balance, Cook's said.

To aid user organizations with departments that are separate profit centers, Ridam maintains a set of prorate percentages for every profit/loss account. Percentages are assigned by the user for each account, and any sales, purchase or expense item that can be is assigned to an applicable department.

Items that cannot be applied such as executive salaries are posted to company-level accounts. At month end, the package prorates all these "house" amounts to the departments and prepares individual department profit/loss statements.

The department amounts are then summed back into the house for a combined profit/loss, and a balance sheet is prepared.

Each of the application subpackages can be used as a stand-alone system with very minor modifications, a Cook's spokesman noted.

Ridam is copyrighted and is available for a one-time charge of $3,000.

Cook's is at 807 S. Broadway, 57201.

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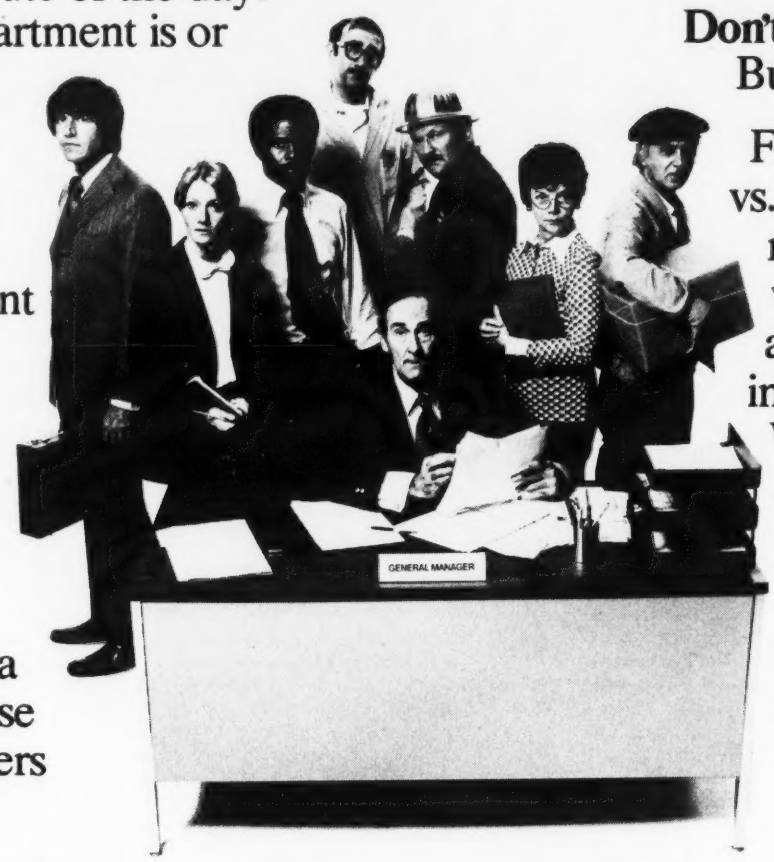

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Cybernet Adds Planning Tool

MINNEAPOLIS – A business planning service on Control Data Corp.'s Cybernet remote-computing network, Interactive Financial Modeling System (IFMS), combines English-language equations – to define problems for later analysis – with a "what-if" capability.

In addition, uncertain future situations can be described using built-in probability functions, the vendor noted.

This collection of features allows the non-DP-oriented businessman to build a current financial model of his company, put in all the variables and, in a conversational mode, explore how changes may affect the company or what would happen if the company actually took certain actions.

The business planner could explore, for example, how combinations of price fluctuations, interest rate changes, capital expenditures and other factors would correlate under "any set of future circumstances," CDC suggested.

Probabilistic analysis gives the probable range of uncertainty in the variables of interest, rate of return, profit, total cost or other factors. Deterministic solutions use average or most probable values, the network added.

Beyond that, a single specification in the English-language "instruction set" allows the user to give the number of time stages for a model whose variables change over time. Once the model is built, a report generator lets the user create his own output.

The system is available through toll-free access to the Cybernet service in more than 50 metropolitan areas in the U.S. It is also installed on the Canadian and European Cybernet networks, a spokesman noted.

On-Line VS Working-Set Display Run as Transaction Under CICS

CINCINNATTI – Working-set VS (WSVS) from CFC Investment Co. is an on-line CICS/VS transaction that presents a graphic picture of a DOS/VS partition on a CRT terminal by indicating each page involved in the partition's working set.

WSVS can be of value in operations, programming, systems programming and CICS/VS tuning, the vendor said.

Two display formats are available. One display is by partition, and this includes the size of the total working set, the exact pages involved in the working set, the name of the program being executed and the address of the instruction to be executed next.

The partition-level display also shows the problem state of the partition and whether the program is running "real" or "virtual." This display format will map partitions as large as 828K bytes on one screen and will indicate an overflow if the partition is larger, according to a CFC spokesman.

The second output format displays information about all partitions. The data shown closely parallels the data in the single partition display: size of each partition's working set, the total of all working sets, names of programs being executed in each partition and an indication of whether each partition is running real or virtual.

The all-partitions display also shows the size of the shared virtual area pages in memory, the spokesman noted.

A repeating display feature allows the user to specify the repeat of a display every one to nine seconds, from one to nine times.

Used with single-partition displays, it shows the changing working set requirements; with the all-partitions display, users can monitor paging demand for the entire system, CFC said.

WSVS was designed to operate on an IBM 3277 Model 2 CRT or equivalent terminal. It resides in 2K of CICS/VS program storage and is currently operational under DOS/VS Release 29.

The package can be acquired for a one-time charge of $750, or leased for 12 monthly payments of $75. CDC is in the Cincinnati Financial Center, 11295 Princeton Pike, 45246.

'Aset' Supports CAI On All Univac 1100s

BLUE BELL, Pa. – Univac 1100 users without formal programming knowledge can develop individualized computer-assisted instruction (CAI) lessons with the Author System for Education and Training (Aset) from Sperry Univac.

Using Aset's basic English syntax, an instructor in education, industry and government can organize and develop original lessons and drills or modify those created by others, the vendor said.

Instructors use Aset through interactive Uniscope 100 display terminals or other terminals compatible with the 1100 series, a spokesman added.

The program is said to include function directives or source data for preparing individualized training material. It then reorganizes this data into an interactive format, delivers it on the display terminal as requested and performs all support functions such as correcting student inputs, generating reports and managing files.

The system may be used in three instruction modes: tutorial, drill and practice and inquiry/dialogue. Aset also provides progress reports and other data needed for individually tailored computer-assisted lessons, the vendor said.

Aset will be licensed for $375/mo from Univac through P.O. Box 500, 19422.

Micro-Based Isyx System Gains Fortran Compiler

COLUMBIA, Md. – The programming capabilities of the Isyx 3780 small business computer system – built around an Intel 8080 microprocessor – have been extended by Isyx Corp. with the introduction of a Fortran compiler which accepts a subset of Fortran IV.

The compiler functions under the floppy disk-based operating system directly on the 3780; it is not a cross-assembler that requires a full-scale mainframe, the vendor stressed.

The compiler is available now for $450 from Isyx through Box 935, 21044.

Say goodbye to PDS compression. Say hello to UCC SIX!

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Utility Packages Set Aside Hardware System Upgrade

By Don Leavitt
Of the CW Staff

ST. PAUL, Minn. – Utility software – if "utility" is accepted as a very broad-brush term covering almost anything except application programs – can be used by an installation as an alternative to spending hardware dollars. Packages in the same range can be an integral part of an installation's information resource security backup and control master plan.

Leading a Computer Caravan workshop on utility software here, Chester L. Adkins noted that extensions or improvements to hardware vendor-supplied system software and facilities by which system utilization and performance can be measured and improved are also possible with some of the utility packages currently available.

Adkins is programming manager for Brown & Bigelow. To add credence to his claims about the capabilities of software packages, he told the workshop he had explored third-party leases for an IBM 360 and proposed a hardware/software system "that reduced current expenditures $60,000 annually and was $100,000 under what an IBM 370/135, (then being considered) would cost."

Though "management wasn't too hard to convince, the hooker in the proposal was that we would have to add more memory, another disk drive and several purchased software packages besides some in-house systems software extensions."

Spooler Package a Failure

Extending memory and disk capability on the 360/40 – bringing it to 256K with eight double-density Control Data Corp. 2314-type disks – "went off great" but attempting to replace IBM's Power with an independent spooler package was a failure.

Printing was faster, but queue management became a problem for the operators. Beyond that, the operators began complaining about occasional severely reduced systems throughput. The new spooler was stealing cycles to manage its own asynchronous processing.

Brown & Bigelow's Power had been modified substantially to fit the company's situation and the independent spooler just could not match that specialized performance. Spooling is still a good way to enhance a system in general, but the alternative to Power was, in this case, returned to the vendor, Adkins said.

Attempts at improving the amount or level of multiprogramming force an increased need for improved security, backup and control of the system software, source programs, tape libraries and Job Control Language (JCL) procedures. In many cases, these improvements can and should be provided through software packages, he added.

At Brown & Bigelow, the entire data base, including the SYSRES pack is dumped to tape daily and every other week the installation does a backup from disk to tape, then a restore from tape to backup disk packs, after which it operates with the restored files.

This procedure, managed by Westinghouse Electric Corp.'s Tape Dump/Restore, protects the day-to-day files but also ensures that the backup operation is in fact working properly, Adkins said. If there is a flaw in the system, it would show up in the use of the restored files before it is too late to recover in case of a problem, he noted.

Other packages supporting the backup and control areas include Panvalet, the source program library system from Pansophic Systems, Inc. that eliminates the need for decks of source cards; Epat, a tape library control package from Software Design, Inc.; and a JCL "Proc Lib" package – also from Westinghouse.

Vendor Support, Local Users

Vendor support and local user availability must be strong considerations in choosing a package, Adkins said, adding by way of example, "Epat costs more than twice as much as (another tape system) but it has nearly 500 installations and several of these are local. If we have a problem, we can usually solve it by talking to other people right here."

Summing up, he said, "in a DOS environment, the highest potential payback seems to be in the following areas: spooling, partition balancing, relocating loader and improved linkage editor, resident libraries directories, resident transients, JCL processing extensions and sorts."

Job accounting packages are almost indispendable in tuning a center's operations, he said, since they provide an objective view of how well things are going – and that may differ sharply from an operator's "seat of the pants" judgment – and they can pinpoint areas in which improvement efforts should be focused.

Responding to a question from the floor, Adkins said that as a member of a very active, local DOS users group, he would be happy to share coding changes he had made on power with anyone who wanted to contact him.

Brown & Bigelow is at 1286 University Ave., and unless the number of requests is overwhelming, there'd be no charge, he added.

'Taxcal' Routines Available in RPG-II

HACKENSACK, N.J. – RPG-II versions of four separate tax calculation routines are now available from Werner Henri, Inc. Taxcal covers tax calculations in the gross-to-net stream; Taxsut calculates employer's liability; Taxscm incorporates special calculations for supplemental and cumulative earnings; and Taxmat covers taxes for employees working in more than one taxing jurisdiction.

Also available in Cobol, Fortran and IBM or Univac Assembler, the routines are distributed as a single package for $1,500 to $3,000, depending on the number of jurisdictions involved, Werner Henri said from 25 Fairmont Ave., 07601.

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Accepts Data From Scanners

Portapen 2 Stores Bar-Coded Numbers

FRANKLIN, Mass. – Identicon Corp. has introduced a portable terminal that can store numeric bar-coded data entered either from a wand scanner or a hand-held 12-digit LED keyboard display.

Called the Portapen 2, the terminal can store up to 28K characters in a solid-state, battery-powered memory. The entire unit with wand, keyboard display, and power pack weighs less than 10 pounds, the company said.

The wand reader can scan the Universal Product Code (UPC) as well as other bar codes. The small keyboard display includes 10 numeric and nine function keys which can be programmed according to the user's software.

The standard unit allows storage of 12K characters, but an additional 8K or 16K characters of storage can be added.

The solid-state memory eliminates the dropping of data bits caused by cassette storage, the firm said. But the solid-state memory is destructive and, if the battery power is interrupted, the data in storage can be lost. The rechargeable battery pack is said to provide up to eight hours of operation without charging.

When data has been stored in the memory, the Portapen 2 can be connected to a combination battery charger/telephone line interface. The data in storage can then be transmitted over dial-up phone lines at speeds up to 2,400 bit/sec in 256-character blocks coded in Ascii.

Data is transmitted asynchronously at 10 bit/char. on a first in/first out basis.

Data can be transmitted directly to a CPU or to an Identicon Data Receiver which stores the information on IBM-compatible magnetic tape. A diskette model is also available.

The terminal can be either hard-wired or acoustically coupled to a phone line and remote terminals can be polled. A hard-wired teletypewriter interface or a Bell Data Access Arrangement can be used.

Communications integrity is said to be assured by block transfer controlled by reverse-channel ACK/Nack protocol. When data is transmitted to the 710 Data Receiver, available software options include IBM 360/370 compatibility as well as Hasp, UT-200 for the Control Data Corp. 6000, and DCT 2000 for the Univac 1100 CPU.

The 710 contains a microprocessor for control functions in addition to a keyboard CRT, and the unit can control polling and auto dial functions.

Identicon Portapen 2

The basic Portapen 2 costs $2,795 in the 12K memory version. The 28K versions costs $3,395 with built-in modem. The data receivers are not included with the basic system.

Identicon is at One Kenwood Circle, 02038.

Universal Access to Nets Foreseen

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – The communications manager of the future will no longer have to be concerned with the configuration of a data communications network. Whatever data he puts in will be correctly delivered to the proper location at a cost based on the data transferred, according to Max Beere, director of telecommunications planning at TRW, Inc.

Speaking at a recent telecommunications seminar held by the National Retail Merchants Association, Beere said it is possible to forsee the day when terminals will be plugged into networks "like toasters."

The concept of universal network access was called the "polyprocessor reticulum (PPR) by Beere, who explained "reticulum" means "a network of cells." The PPR concept can begin to usher in an expansion to systems of computers as a gradual evolution to the fourth generation of hardware, he said.

Citing recent technological innovations such as the microprocessor, he said the communications impact was being evidenced in solid-state telephone exchanges and all-digital communications services. The new value-added network services will tie it all together, he added.

The PPR is an amalgam of value-added network service, solid-state switching, microprocessors, chip memories, data base management and terminal advancements. The entire concept will bring the cost of communicating down to the worth of the data, he predicted.

The PPR is a network of intelligent information processing elements distributed locally and remotely. It is governed by a software system that enables each module to dynamically alter its basic characteristics to fit the individual's problem-solving needs, he said.

Such a service would be available to the user at all times and the user would be charged only for the time and resources actually used, he added.

"Our concept in this area is to have 'cells' of interest, such as supermarkets, banks, retail, etc., that attach to the PPR," Beere explained. Each "cell" has intracell communications and intercell communications capability.

The technology is available to allow for data exchange as needed between any of a number of data bases, he pointed out. Since the PPR is transparent to the user, it can accommodate a variety of terminals that fit the user's needs.

Business doesn't have this network capability available today. Segments of it have been built, but "to achieve the greatest utility, cost effectiveness and efficiency, we must work towards a data communication scheme such as the PPR concept," Beere said.

"We don't know when this will happen, but when it does, we think data communications will be really worthwhile," he concluded.

IMP Language for Sanders 810 Eases Distributed Applications

NASHUA, N.H. – Sanders Data Systems has introduced a terminal-based high-level programming language designed to simplify the development of distributed processing applications.

Called the Information Management Package (IMP), the language operates on the Sanders 810 disk-oriented intelligent display system. The capability of an IMP system is said to give users twice the transaction-handling capability of an IBM System/3 at about 50% of the cost. An IMP system was demonstrated last week at the Interface '75 conference in New Orleans.

Designed for such applications as order entry, inventory control, invoicing, accounting, personnel records and insurance claim processing, IMP provides capabilities for entering, manipulating and retrieving data as required.

It allows data to be transmitted to a mainframe or to be processed entirely by the Sanders IMP system. Clustered CRT terminal configurations can be supported for local processing operations.

A minimum Sanders 810 disk system with IMP is comprised of an 810 microprocessor, a display terminal with Ascii keyboard and 80 by 24 upper/lower case screen, 5M-byte disk and controller, 8K bytes of control memory, 4K-byte general-purpose buffer channel, a disk read-only memory (ROM) loader and a printer buffer.

Options include up to four 1,920-character terminals or up to six 960-character terminals with Ascii, data entry or typewriter-style keyboards. This expanded display configuration makes it possible to run six applications simultaneously, Sanders said.

The IMP communications modules provide flexibility of line discipline. The standard system uses binary synchronous line control with Ascii or Ebcdic transmission codes.

Transmission rates are either 2,000- or 2,400 bit/sec over dial-up or point-to-point private lines.

IMP-generated data bases can be handled completely by the 810 system interacting with CRT terminals. But the data bases or portions of them can be interchanged with IBM 360/370 mainframes using communications when required.

A basic IMP system costs $735/mo on a 48-month lease or can be purchased for $25,790. The software is available without charge for users with the necessary hardware already installed. The company is on Daniel Webster Highway, 03060.

Harris RJE Subsystem Works With Vulcan

FORT LAUDERDALE, Fla. – The Harris Corp. Computer Systems Division has introduced a remote job entry (RJE) subsystem for use with Vulcan, the company's virtual memory operating system.

Previously available for use under disk monitor systems only, the RJE package allows a Vulcan user to communicate with one or more sites via synchronous transmission over standard or conditioned telephone lines. This may be done concurrently with other local tasks, the vendor noted.

RJE subsystems are currently available for the following host computers: Univac 1004-type for the 1100 series. Control Data Corp. UT-200-type for the 6000 and 7000 series and IBM 2780 and the Hasp II workstation types for the 360 and 370 series.

RJE subsystem installations are priced at $5,000 per host computer. Harris is at 1200 Gateway Drive, 33309.

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Xerox Offers Model 3625 Programmable Processor

EL SEGUNDO, Calif. – Xerox Corp. has introduced a programmable communications processor that operates with a wide variety of terminals.

The Model 3625 communications processor is said to be the first capable of interfacing multiple modes of data transmission with a single type of line interface module.

The Model 3650 dual multimode line interface module (LIM) used by the 3625, the company said, is the "only interface now available" which can handle synchronous, asynchronous and isochronous transmissions in the same interface.

The programmable line interfaces were designed to permit increased control and utilization of equipment in dial-up communications installations and to provide enhanced error detection. The 3625 will operate with the Xerox 560 and Sigma 9 systems using the Control Program-Five (CP-V) operating system.

The processing unit of the 3625 has a 350 nsec instruction cycle time and up to 32K words of memory.

It will accommodate all standard character lengths, from 5 to 8 bits. Up to 128 synchronous, programmable asynchronous and/or isochronous communications lines with an aggregate bandwidth of 10K char./sec can be handled through each interface module.

Nineteen different asynchronous line speeds, ranging from 37.5 bit/sec to 19,200 bit/sec are standard, and any 16 may be coresident in a single system. All line speeds, modes of communication, code structures and line types may be freely intermixed, the company said.

Control and reliability features of the 3625 include error-checking logic and circuitry to assist in fault isolation of communications channels. Both on-line and off-line diagnostics are provided and do not interfere with the normal operations of the host computer.

Communications terminals presently supported by the 3625 include: Teletype models 33, 35 and 38 (APL); four versions of the IBM 2741 (Correspondence code and Ebcdic, each with or without APL); Hasp Version 3.1 terminals such as the IBM 360/20 and Xerox satellite processor; and the IBM 3270 or equivalent used as a transaction processing terminal.

A typical 3625, which includes any mix of 32 synchronous and asynchronous lines, is priced at $55,800, with one-, four- and six-year lease rates available. Delivery is scheduled for the fourth quarter. Xerox is at 701 South Aviation Blvd., 90245.

Terminal Transactions

Batch Devices Handle Three Vendors' CPUs

LEBANON, Ohio – Cincinnati Milacron has three remote batch terminals, the Model CIP/220, CIP/240 and CIP/260, designed to provide communication protocol compatibility to Control Data Corp., IBM and Univac mainframes respectively.

The CIP/220 terminal operates with CDC 6600 mainframes under Export/Import disciplines. The CIP/240 terminal functions with IBM 360 or 370 systems operating under Hasp or ASP line disciplines and the CIP/260 terminal runs with Univac 1100 CPUs under the Exec 8 operating system.

Hardware Identical

The basic terminal hardware package is identical for each remote batch station, the vendor noted. The difference between the systems is the program which is loaded.

A basic configuration includes a Cincinnati Milacron CIP/2200B minicomputer with direct memory channel, read-only memory, 30-in. cabinet, power fail, auto restart, real-time clock, 16K core memory, basic front panel, teletypewriter console, 600 card/min reader, 65 line/min printer and bisynchronous modem controller.

Standard Features

Each terminal comes with its respective software. Data speeds of 1,200-, 2,000-, 2,400-, 4,800- or 9,600 bit/sec are included.

Batch transmission, auto retransmission, compression of blank or zero spaces and automatic handling of transmission disciplines are some of the standard features, the company said.

A basic terminal configuration costs "under $23,000" or $700/mo on a five-year lease with maintenance. The firm is at Route 48 and Mason Road, 45036.

CRT Series Displays 'True APL,' Ascii

MINNEAPOLIS – Research, Inc. has introduced the Series 3900 Teleray CRT terminal which provides APL, full Ascii and upper-case teletypewriter display capabilities.

The 3900 is said to display "true APL" overstrike and underline characters; it also has an optional Ascii mode overstrike capability. The terminal has an APL/Ascii typewriter-pairing keyboard and both character sets are described as "computer-switchable" with the appropriate interfacing.

14 Data Speeds

The 15-in. CRT operates over any 14 standard asynchronous data speeds up to 9,600 bit/sec with any two speeds switch-selectable from the keyboard. The switch-selectable speeds can be reconfigured as needed by the user.

The display operates scroll-up with bottom line data entry and bottom line cursor controls and includes RS-232, current loop and teletypewriter interfaces. Screen capacity is 1,920 characters; options include a numeric pad, detachable keyboard and a receive-only version.

The basic unit costs $2,490 with delivery in 40 days. Research can be reached through Box 24064, 55424.

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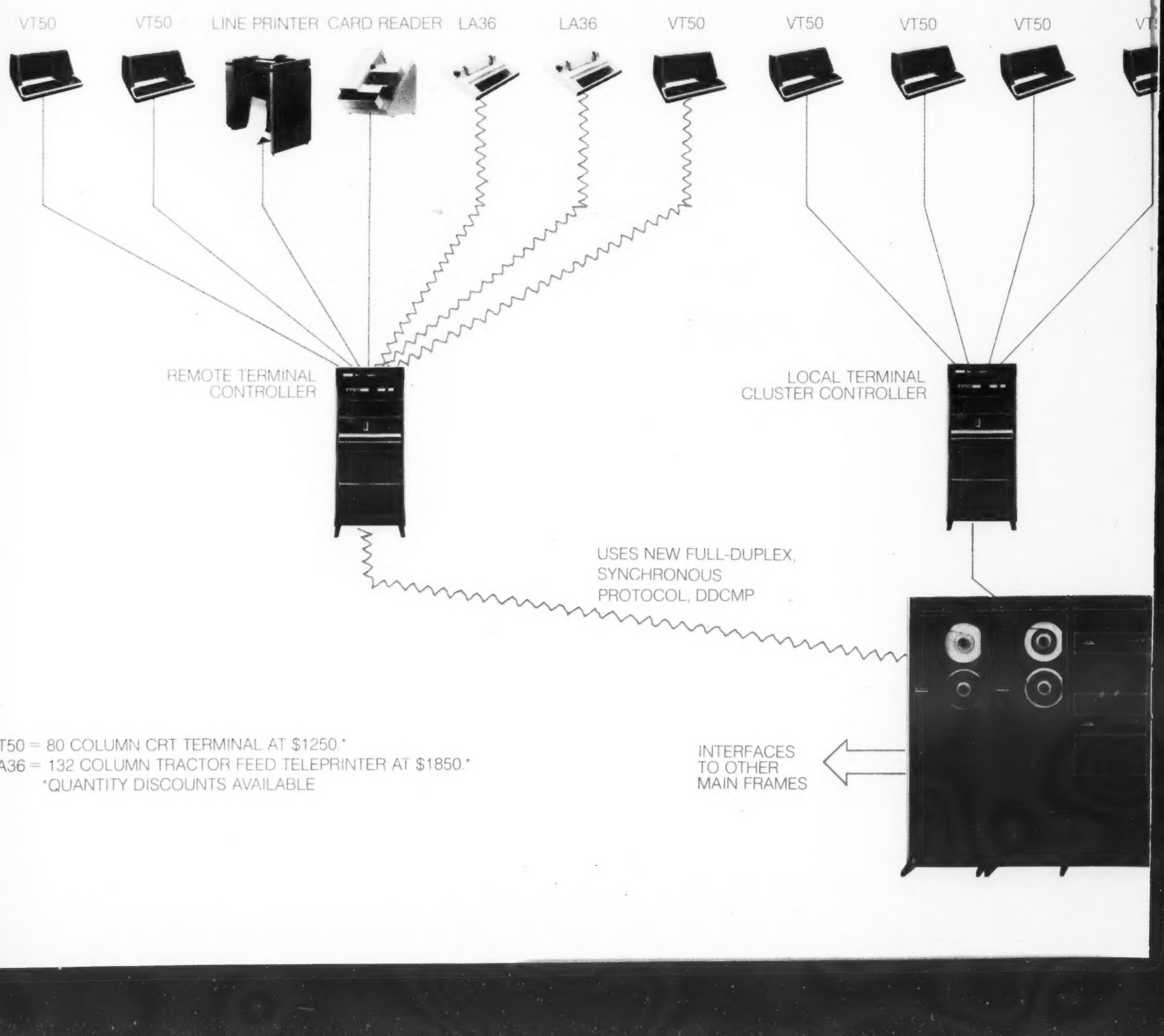

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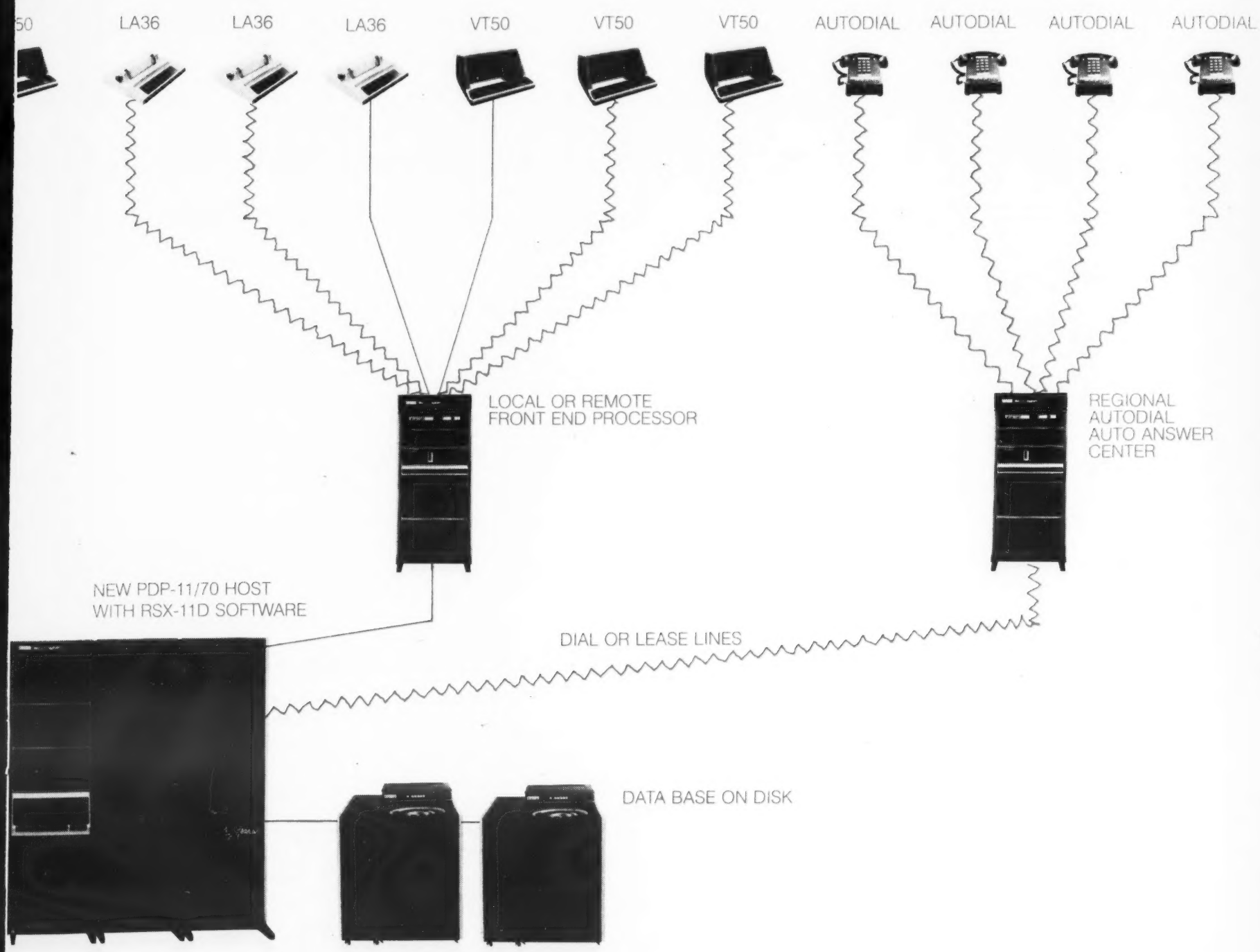

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Independent's Adapter Lets Firm Configure S/3 Data Network

By a CW Staff Writer

GRAND JUNCTION, Colo. – Union Carbide Corp. has installed an ISC Terminal Adapter on its IBM System/3 Model 10 to transmit data between Bishop, Calif., and its plant here.

With the addition of the adapter from Digital Systems Corp. of Frederick, Md., Union Carbide has been able to handle the Bishop payroll at the Colorado location by transmitting data at 300 bit/sec using a GE Terminet teleprinter.

At present, data is transmitted to a GE terminal which stores the information on a cassette unit. This data is then batched through the adapter into the System/3 daily in two-hour jobs.

After the CPU has processed the payroll information, the data is sent back to the Terminet cassette unit through the adapter, which handles the translation of data. This translation is required since the System/3 uses Ebcdic while the terminals operate with Ascii code.

When the completed payroll is transmitted back to Bishop, the terminal prints out the paychecks using the totals generated by the System/3. A payroll for 375 employees at Bishop is processed on a regular basis.

Keyboard Only Change

Since Union Carbide already had the Terminet units, the only change that had to be made was the addition of a keyboard to the CPU and the adapter. Together, the keyboard and the adapter cost about $118/mo, according to E.B. Guthrie, assistant office manager at the Colorado plant.

The addition of the adapter cost considerably less than getting the communications capability from IBM, Guthrie said.

Based on the success of the initial application, Guthrie said, other accounting and distribution applications will be added. Further, the Terminet cassette units will be replaced by tape storage units from Three Phoenix Co. to enable the Terminet units to transmit at 2,400 bit/sec instead of the present 300 bit/sec, he said.

Early next year, Union Carbide intends to begin transmitting data to plants in Alamo, Nev., and Alice, Texas. The Colorado plant is part of the Union Carbide metals division and handles uranium and vanadium concentrates.

"Since August of 1974, when the system was fully operational, we have processed payroll data each week in Colorado and printed their checks in California – and I don't think there has ever been an error," Guthrie said.

"We performed our own installation. Naturally, there were some problems in the very beginning," he said, "but we worked them out fast and since that time have had no difficulties.

"Our cassette reader, connected via the adapter, is just like any auxiliary tape or disk file – we don't expect errors to occur, and they don't."

Terminal Transactions

Imlac Mini-Based Unit Displays Graphics at 40 Frame/Sec Rate

NEEDHAM, Mass. – The Imlac Corp. PDS-4 graphic display system can display up to 3,000 characters or 2,400 inches of vector-generated information at a refresh rate of 40 frame/sec.

The display system includes a control which allows magnification and demagnification by a factor of 2 as well as control of X and Y positions.

The minicomputer-based interactive display system features a 990-nsec memory (4K words, expandable to 32K) and a display processor which provides image generation independent of, but under direct control of, the minicomputer.

PDS-4 users can generate alphanumeric and vector-drawn graphics within a 14,336 by 14,336 raster and, under interactive control, can display and manipulate any relative 2,048 by 2,048 section.

Because descriptions of characters and other symbols are stored in read/write memory, they may be defined by the user; the display processor will display them anywhere on the screen independent of the minicomputer. These characters and symbols may be rotated 360° in 90° increments, reflected about the Y axis and/or scaled from 1 to 7 sizes, all as part of the standard display processor hardware.

Hardware Options

A full complement of peripheral hardware options is available. A "powerful" instruction set is included in base price of the PDS-4.

A variety of communications interfaces are available so the system may be used with other minicomputers or with large mainframes at high-speed communication rates (up to 600K bit/sec).

The basic system costs "under $20,000" from 150 A Street, 02194.

WUI Asks Hawaiian IDDS Service

NEW YORK – Western Union International, Inc. (WUI) has filed an initial application with the Federal Communications Commission (FCC) to offer its International Digital Data Service (IDDS) between the U.S. mainland and Hawaii.

WUI previously asked authority to offer IDDS to Austria, France, Italy and Spain.

IDDS features simultaneous transmission of data over both satellite and undersea cable links. It is fully compatible with the emerging digital systems of the various U.S. domestic carriers as well as conventional offerings, WUI said.

Customers will have available full-time data transfer capability at the following standard speeds: 50-, 75-, 100-, 200-, 600-, 1,200-, 4,800- and 9,600 bit/sec.

IDDS charges would consist of a service access charge and a usage charge. The usage charge will vary with the volume of data transmitted.

Monthly Charges Vary

The monthly access charge between the mainland and Hawaii will range between $700 for service at 50 bit/sec and $3,000 for service at 9,600 bit/sec. As an example, 40 hour/mo of full-duplex transmission at 2,400 bit/sec will produce a total charge of $3,902.

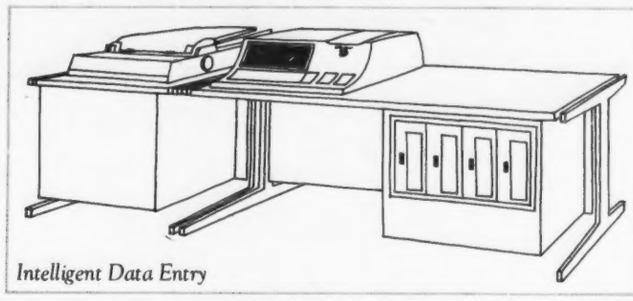
Both the European and Hawaiian proposals for IDDS are now under consideration by the FCC.

Dispersed Data Processing: An Idea Whose Time Has Come– Just in Time.

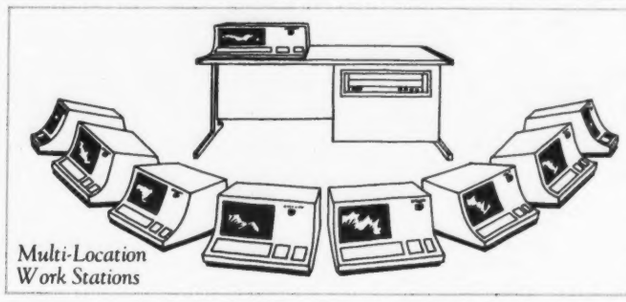
Dispersed data processing the Datapoint way offers a practical, convenient, economic way to get computing power out where the action in a business really is, out in field facilities where sales, purchasing, manufacturing, inventory and other important source documents are first generated.

Many organizations today have costly central computers but find it difficult to make their power available to remote locations where it can be used most profitably. These central computers often operate only at a fraction of their potential. To solve this problem, Datapoint Corporation has pioneered and implemented the concept of dispersed data processing, an idea whose time has come, just in time, for maximum economy and efficiency at many businesses.

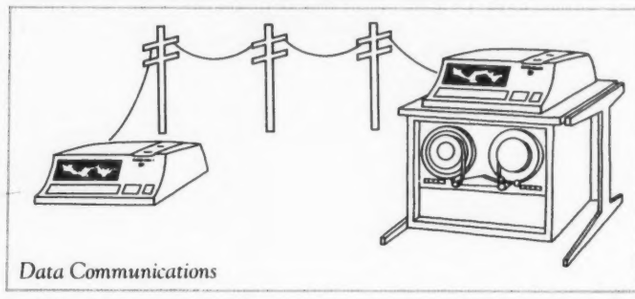
Datapoint dispersed processing equipment integrates a data conversion/entry, data processing and data communications capability. It makes it possible for personnel in a company's field offices to capture, "package", and move data efficiently to a central computer, and/or maintain local data files and perform processing tasks without having to go to a central computer at all. With three fully programmable dispersed processors, the Datapoints 1100, 2200 and 5500, associated peripherals and complete operating software, system configurations can be easily tailored to the work load of each field office, subsequently adjusted and expanded as that work load changes. Further, Datapoint equipment interfaces readily with all standard central computers and line disciplines through proven emulation routines.



Intelligent Data Entry



Multi-Location Work Stations



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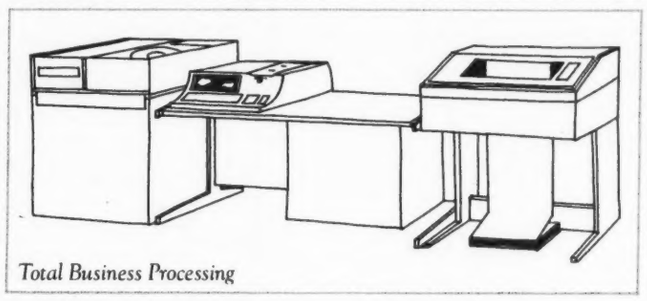

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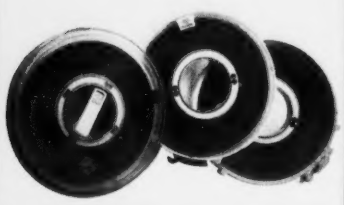

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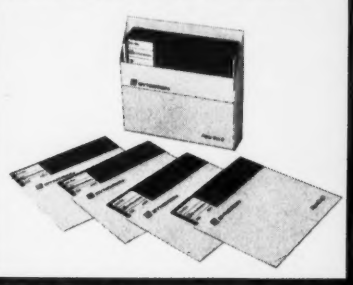

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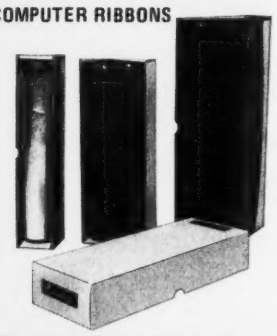

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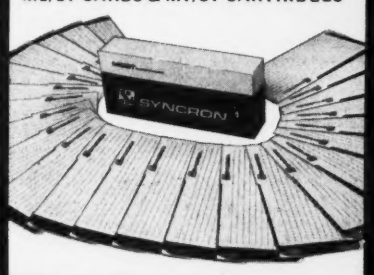

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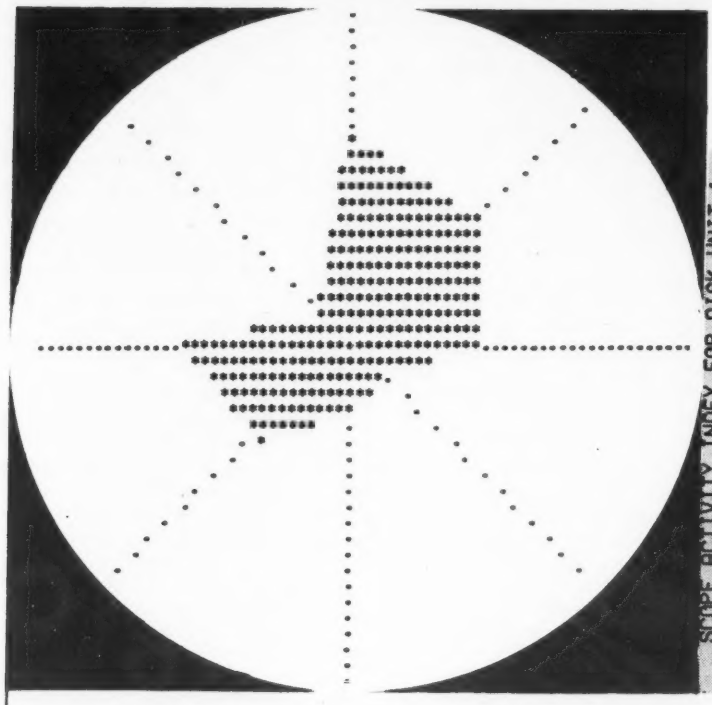

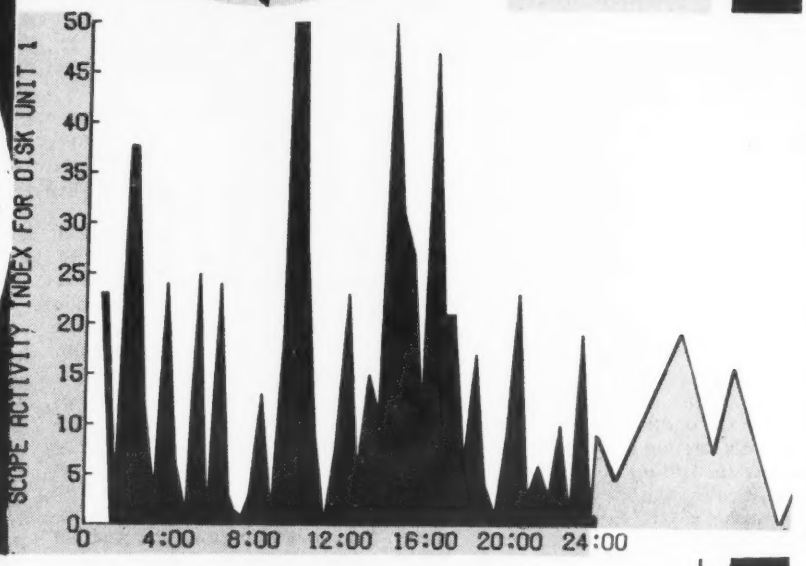

A Short Course on CPE

Knowing ABCs of DP Monitoring Tools Vital Today

By John J. Hunter
Special to Computerworld

Management no longer views DP as surrounded with mysticism, as it did a generation ago; it now sees it as a cost center, not a status symbol. For that reason, smart DP managers lean toward computer performance evaluation (CPE).

A recent study conducted by Auerbach found there are three prime reasons for performing a CPE study: to reduce costs, to attain better user charging and to provide better management information concerning DP performance.

CPE can help reduce DP costs by avoiding unnecessary outlays for equipment upgrades. This can be accomplished either by determining that requested equipment acquisition/expansion is not required or by improving the performance of existing equipment to the point that it can fulfill projected needs.

A CPE study can determine whether equipment expansion or acquisition is necessary by estimating hardware requirements to support projected software workload additions.

Another instance where CPE can be useful in reducing expenditures is in dealing with vendor marketing strategies. For example, a vendor may artificially limit memory sizes on processors so a user must move up the line to the next faster processor (with the associated increase in rental) to get more memory.

'Management no longer views DP as surrounded with mysticism, as it did a generation ago; it now sees it as a cost center, not a status symbol.'

CPE can help in two ways here. First, by providing an analysis of current programs, it can assure that current programs are not using excessive memory and that the job mix is making effective use of the memory. Second, such a study can indicate whether any advantages would accrue from a faster processor.

It should be noted that CPE does not always result in recommendations to reduce expenditures. Sometimes, a CPE study will show the projected workload cannot be met with current equipment, although this is the original plan (or hope). In either case, management is presented with the facts and alternatives and then must exercise its judgments.

The last major use of CPE tools is to provide management with sufficient information to identify operational problems and make several decisions. The tools can also be the basis for tying the DP center into the normal company cycle of setting goals, stating objectives, measuring success (or failure) in meeting objectives and, finally, reporting whether or not objectives were met to management in a regular, systematic and ongoing way.

CPE Tools

Three classes of tools are available for CPE analysis: hardware monitors, software monitors and accounting packages. As a general guideline, hardware monitors are best for measuring hardware activity, while software monitors do a better job measuring software.

Both types of monitors intrude into the other's domain, but the levels of accuracy and degree of capability differ.

For example, both hardware and software monitors can measure CPU activity, but the hardware monitor figure is inherently more accurate because it doesn't degrade the system, and it can always take measurements, even when the operating system is running with interrupts disabled. Software monitors do not enjoy these advantages.

The hardware monitor consists of probes, cables, logic plugboard, monitor and data recorder. Together, the monitor and recorder track the electrical pulses making up the data flowing through the machine.

As the computer system functions, pulses flow through pins or test points designed and located on the back panel for use by the vendor maintenance engineer. In effect, the test pins or points are "windows" which allow the monitor to look inside the system; each window opens on one specific thing. Normally, the customer engineer looks in the windows with an oscilloscope attachment which does not disturb the system in any way; thus the attachment is passive.

A hardware monitor functions in precisely the same way, although its internal electronics and capabilities are much superior to an oscilloscope. It attaches to a system by means of physical connections called probes.

Hardware monitors are used to measure CPU busy, CPU waiting, disk seek, disk data transfer, disk mount, tape busy, tape rewind and memory utilization. The level of component activity is called "percent utilization" and is the amount of time a component is actually in use during the measurement period.

For example, if the CPU is in use 30 minutes during a one-hour measurement period, it would be said to be 50% utilized. The same is true for Channel No. 1 if it is also in use 30 minutes.

If one wants to know when these utilizations take place within the hour, the issue of concurrency, or overlap, is raised. For example, if the CPU is in use for the first thirty minutes of the hour, and the channel is in use for the second thirty, the degree of concurrency is zero. If, on the other hand, both are used during the same 30 minutes, the degree of overlap is 100%, even though the utilization of each component is only 50%.

Memory utilization is an interesting measurement. Unlike CPU busy, we cannot simply take the time available and divide it by the measurement time. It would aways be 100% because some memory is always in use.

So, we go to the concept of memory occupancy. To do this, we must accumulate statistics on the level of memory in use and the amount of time the memory is in use.

Memory occupancy then becomes a weighted average level of utilization, with the amount of time spent at each level being used as the weight. To continue our example, say we were running a test for one hour on a machine with 1 million words of memory. During processing, 250,000 words are in use for 15 minutes, 500,000 words for 30 minutes, and 750,000 words for 15 minutes. Memory utilization (or occupancy) would then be 50%.

Another capacity measured is disk capacity. How much space is allocated but not used? How fragmented are the prime storage areas on the packs? By reorganizing records to fill these vacated prime areas, the overhead associated with maintaining large overflow areas can be greatly reduced.

Although the level of disk-seek activity can be measured either by hardware or software monitors, the capacity studies are the domain of the software monitors. Some software monitors go so far as to analyze the seeking situation, provide a report showing exactly how to reorganize files and even provide the estimated seek time savings if the advice is followed.

Software Monitors

The software monitor is a program which is appended to the operating system or runs as a high-priority problem program or system task. The software monitor can provide very accurate resource utilization data because it can read internal tables, operating system control blocks, status registers, memory maps and so on.

It has two great drawbacks: it degrades the system up to 10%, and it provides questionable CPU utilization figures because it cannot sample while supervisor interrupts are disabled. Therefore, it registers higher CPU busy figures in problem program state and less in supervisor state than actually occurs. The overall error, according to user experiences, runs around 10%.

'The operating system is a good place to look for performance improvement because it is large and frequently used.'

The objectives of measuring system software components differ from those of measuring hardware components. Instead of levels of hardware utilization and concurrency, measurements are performed to determine utilization and hardware requirements. System software components commonly measured are operating systems, support software and user programs.

Operating System

The operating system is a good place to look for performance improvement because it is large and frequently used. Such measurements are done partly for information and partly for action.

As information, they tell DP management how much of the resources are devoted to the operating system and also identify particularly inefficient sections of code, which could lead to asking the vendor for improvement. If this is impossible, one might consider a commercially available software as a replacement.

The study might also indicate that the placement of certain routines should be altered. For example, the number of operating system subroutines supplied by the vendor may be so large that all cannot be made core resident. Therefore, some will be placed in secondary storage, usually disk. The decision as to which modules go where is usually made based on the vendor's recommendations when the system is installed. These recommendations may have been right for the installation at that time, but the installation's workload has probably changed.

Support Software

Support software falls in the gray area between user programs and the operating system. Although run in the system much like user programs, they are written by the vendor and appear to the ordinary computer user as part of the operating system. Examples are compilers, communications programs and utilities.

With compilers and communications programs, the user is not looking to modify the code of these complex programs, but rather to know what they cost in terms of resources. The aim is to ask the vendor to improve the program and/or to investigate using alternative software.

In the area of utilities, CPE gives the user the most flexibility. Because utilities are frequently used, they offer high payoff potential. What additional measurements are usually taken for utilities?

Basically, the same measurements as for user programs. The user can reasonably make changes to the actual utility code if the study indicates it is necessary. Utilities can often be changed without vendor assistance and without fear of disturbing the operating system.

User Programs

User programs are measured to determine resource utilization and code efficiency. Resource utilization measurments record and report the amount of time a program uses each of the resources it requests such as core, tapes and disk.

Sometimes the utilization is zero, because the programmer allowed for the worst case. For example, the utility may request eight tape drives, even though it normally needs four. If the installation is short of tapes and the number of runs that need all eight tapes is one in thirty (monthly closing), perhaps the center will ask a programmer to change the utility.

Another important aspect of resource analysis is to determine I/O activity and block sizes. Sometimes a program requires 10 more I/Os than necessary because the records were improperly blocked.

Code efficiency analysis involves measuring the amount of time spent in each identifiable section of code. A commonly observed phenomenon in business indicates that 20% of the customers account for 80% of the business volume. The same often holds true for programs.

Accounting Packages

Most modern operating systems maintain statistics showing resources requested and utilized by jobs. By passing this data through data reduction routines, the DP center can bill individual users and also gain some insight into which jobs best use or misuse system resources. Armed with such information and a little common sense, the DP manager can shuffle jobs to obtain the best possible mix.

The best known statistic gatherer is IBM's System Management Facilities (SMF). In all, SMF captures 31 record types, but five types are of real value in analyzing efficiency.

The Type 1 record contains system wait time. This is written every 10 minutes and shows the amount (in time) of waits since the last record was written. This data can be used to estimate the OS CPU overhead.

'In all, SMF captures 31 record types, but five types are of real value in analyzing efficiency.'

The Type 4 record is created when a job step terminates, and shows CPU active time, initiation and termination times, main storage requested and used. I/Os are summarized by address, type, class and EXCP count for each device. EXCP is the count of the number of times a channel program specifying that device was executed; thus, it counts the physical I/Os to and from a device.)

The Type 5 record is created when a job terminates; it simply summarizes and totals the Type 4 data.

Types 14 and 15 describe each data set utilized by a job step. It shows data set name, organization (direct, partitioned and so on), record size and format, block size, number of devices the data set is on, EXCP count, unit address and channel address.

The recorded data, when passed through a data reduction routine, provides a wealth of information. It can, for example, show elapsed time and CPU time percentages for each job and job step. Further, the data can be used to determine the core wasted and at what times; identify programs that need blocking changed due to the access method used; identify jobs that excessively open/close data sets; identify multiple extents (file extentions); summarize EXCP data to obtain total counts by device and channel and also identify the most highly active data sets and their locations; and perform workload analysis. The latter is accomplished by utilizing step records to isolate elapsed time, CPU time and region/partition size requested and used.

Hunter is project editor for Auerbach Software Reports.

Monitor Helps 'Insure' Applications, Monthly Tuning

Special to Computerworld

LONDON, Ontario – Even with the use of its IBM 370/168 VS system, the ability to ensure maximum performance and optimize resources is a prime concern at London Life Insurance Co. here.

The company acquired the 370/168 in September 1973 because its workload had outstripped the capacity of its 360/50 and 360/65, according to Ronald W. Murray, London Life's senior technical analyst.

Based on operating history and present trend, the workload should continue to grow at a rate of 5% to 9% as the company expands into new insurance areas and gains additional clients in existing and new areas, Murray added.

To ensure that the system is operating at its peak and all resources are being properly allocated, Murray and his group run the Boole & Babbage, Inc. Configuration Utilization Evaluator (CUE) software monitoring system every time a new application is added and at least once a month to "tune" the hardware.

"We use the software monitor to assist us in isolating heavy page rate areas and to ensure that all are being handled properly and in a timely manner," he commented.

"It also assists us in making certain we have fairly equal device utilization and that we have the proper placement of our data sets on particular volumes," he said.

Better Channel Utilization

Murray noted proper channel utilization has been an area of key concern as well as a common source of problems for London Life. "Shortly after our system was on-line and operating, we used CUE and, after studying the reports, we found our channels were out of balance by about 20%," he said.

"After making some software adjustments, we were able to balance the channels and achieve much better throughput from the system."

Murray commented that visual monitoring of the system and its operation is extremely difficult because of the length of time necessary for the observation before any determinations can be made. However, with a software monitor, the firm is able to run the monitor on the system and receive condensed time reports to provide the objective overview statement. From this statement, actions can be taken to improve performance.

"Over a period of time studying the reports," Murray noted, "you can see trends and places where specific peaks are hitting. Then you can go in and make specific changes to level out the peaks or to short-circuit problems before they arise."

The CPU and I/O overlap reports have been of considerable assistance to Murray's team because they let it see what is going on over the specific channels. With only simple changes, the DP shop has been making significant savings in this area by keeping the CPU use at its optimum and by reducing waiting periods, he said.

"We've found that it was easy to improve our efficiency by 10%," he said.

In addition to handling hardware problems, the software monitor has assisted London Life by pointing out some software problems. "In one instance, we had a particularly high average page service time per request, about 125 msec," Murray stated.

"By studying the reports, we could see where the problems occurred and, by tracing the software back against the reports, we located the specific program locations which were causing the problems. Then with a few very minor program rewrites, we eliminated the software bottleneck and were able to reduce our average service time per request down to 70 msec."

All in all, Murray estimated the software monitor has assisted his department in improving the system's efficiency by 15%. Unfortunately, this improved efficiency is not easy to maintain.

"Every time we add a new application – and we are constantly adding or subtracting applications – there is an impact on the system's efficiency. We've also found that channels, our need for direct access and our volume activity during certain periods will dramatically affect the system's efficiency. If you don't keep on top of it constantly, your system's efficiency can drop by as much as 10% in less than a week," Murray said.

"The IBM VS system has many overall and individual advantages for firms such as ours involved in a multitude of areas," Murray contended, "but it requires a greater degree of sophisticated monitoring and measuring to ensure that it provides all of those advantages to us and our customers."

System Gives Early Warning Of Bottlenecks

Special to Computerworld

ST. LOUIS – McDonnell Douglas Automation Co.'s DP headquarters here not only provides complete DP support for the firm's five major divisions but also offers commercial DP services to clients in all types of industries via an extensive telecommunications network.

As a result, operating efficiency, maximum throughput and minimal response time are prime operational requirements.

The firm presently operates two IBM 360/195s and two 370/168s, as well as a complete range of supportive peripherals, according to Betty Polczynski, senior section manager.

To measure all of the systems' performance, the firm uses Boole & Babbage's Configuration Utilization Evaluator (CUE) software monitor. The monitor helps the firm quantitatively evaluate the overall hardware performance of the firm's systems and is used in conjunction with a hardware monitor and performance reports based on SMF data, she said.

CUE is run twice daily during the operation's two peak-load periods in the morning and afternoon. By doing this, the center obtains early warning on problems or bottlenecks which might occur, Polczynski said.

She added that the software monitor also helps the center develop trends regarding system performance and permits

(Continued on Page S/6)

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Independent's Adapter Lets Firm Configure S/3 Data Network

By a CW Staff Writer

GRAND JUNCTION, Colo. – Union Carbide Corp. has installed an ISC Terminal Adapter on its IBM System/3 Model 10 to transmit data between Bishop, Calif., and its plant here.

With the addition of the adapter from Digital Systems Corp. of Frederick, Md., Union Carbide has been able to handle the Bishop payroll at the Colorado location by transmitting data at 300 bit/sec using a GE Terminet teleprinter.

At present, data is transmitted to a GE terminal which stores the information on a cassette unit. This data is then batched through the adapter into the System/3 daily in two-hour jobs.

After the CPU has processed the payroll information, the data is sent back to the Terminet cassette unit through the adapter, which handles the translation of data. This translation is required since the System/3 uses Ebcdic while the terminals operate with Ascii code.

When the completed payroll is transmitted back to Bishop, the terminal prints out the paychecks using the totals generated by the System/3. A payroll for 375 employees at Bishop is processed on a regular basis.

Keyboard Only Change

Since Union Carbide already had the Terminet units, the only change that had to be made was the addition of a keyboard to the CPU and the adapter. Together, the keyboard and the adapter cost about $118/mo, according to E.B. Guthrie, assistant office manager at the Colorado plant.

The addition of the adapter cost considerably less than getting the communications capability from IBM, Guthrie said.

Based on the success of the initial application, Guthrie said, other accounting and distribution applications will be added. Further, the Terminet cassette units will be replaced by tape storage units from Three Phoenix Co. to enable the Terminet units to transmit at 2,400 bit/sec instead of the present 300 bit/sec, he said.

Early next year, Union Carbide intends to begin transmitting data to plants in Alamo, Nev., and Alice, Texas. The Colorado plant is part of the Union Carbide metals division and handles uranium and vanadium concentrates.

"Since August of 1974, when the system was fully operational, we have processed payroll data each week in Colorado and printed their checks in California – and I don't think there has ever been an error," Guthrie said.

"We performed our own installation. Naturally, there were some problems in the very beginning," he said, "but we worked them out fast and since that time have had no difficulties.

"Our cassette reader, connected via the adapter, is just like any auxiliary tape or disk file – we don't expect errors to occur, and they don't."

Terminal Transactions

Imlac Mini-Based Unit Displays Graphics at 40 Frame/Sec Rate

NEEDHAM, Mass. – The Imlac Corp. PDS-4 graphic display system can display up to 3,000 characters or 2,400 inches of vector-generated information at a refresh rate of 40 frame/sec.

The display system includes a control which allows magnification and demagnification by a factor of 2 as well as control of X and Y positions.

The minicomputer-based interactive display system features a 990-nsec memory (4K words, expandable to 32K) and a display processor which provides image generation independent of, but under direct control of, the minicomputer.

PDS-4 users can generate alphanumeric and vector-drawn graphics within a 14,336 by 14,336 raster and, under interactive control, can display and manipulate any relative 2,048 by 2,048 section.

Because descriptions of characters and other symbols are stored in read/write memory, they may be defined by the user; the display processor will display them anywhere on the screen independent of the minicomputer. These characters and symbols may be rotated 360° in 90° increments, reflected about the Y axis and/or scaled from 1 to 7 sizes, all as part of the standard display processor hardware.

Hardware Options

A full complement of peripheral hardware options is available. A "powerful" instruction set is included in base price of the PDS-4.

A variety of communications interfaces are available so the system may be used with other minicomputers or with large mainframes at high-speed communication rates (up to 600K bit/sec).

The basic system costs "under $20,000" from 150 A Street, 02194.

WUI Asks Hawaiian IDDS Service

NEW YORK – Western Union International, Inc. (WUI) has filed an initial application with the Federal Communications Commission (FCC) to offer its International Digital Data Service (IDDS) between the U.S. mainland and Hawaii.

WUI previously asked authority to offer IDDS to Austria, France, Italy and Spain.

IDDS features simultaneous transmission of data over both satellite and undersea cable links. It is fully compatible with the emerging digital systems of the various U.S. domestic carriers as well as conventional offerings, WUI said.

Customers will have available full-time data transfer capability at the following standard speeds: 50-, 75-, 100-, 200-, 600-, 1,200-, 4,800- and 9,600 bit/sec.

IDDS charges would consist of a service access charge and a usage charge. The usage charge will vary with the volume of data transmitted.

Monthly Charges Vary

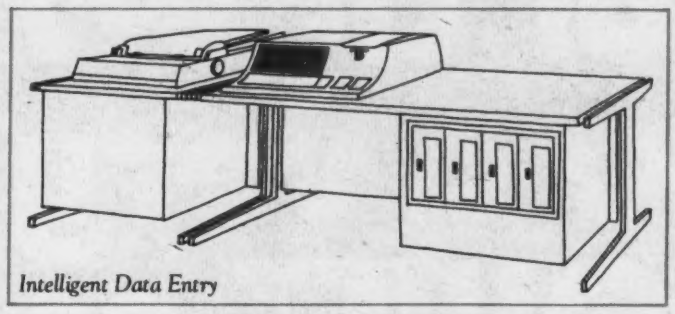
The monthly access charge between the mainland and Hawaii will range between $700 for service at 50 bit/sec and $3,000 for service at 9,600 bit/sec. As an example, 40 hour/mo of full-duplex transmission at 2,400 bit/sec will produce a total charge of $3,902.

Both the European and Hawaiian proposals for IDDS are now under consideration by the FCC.

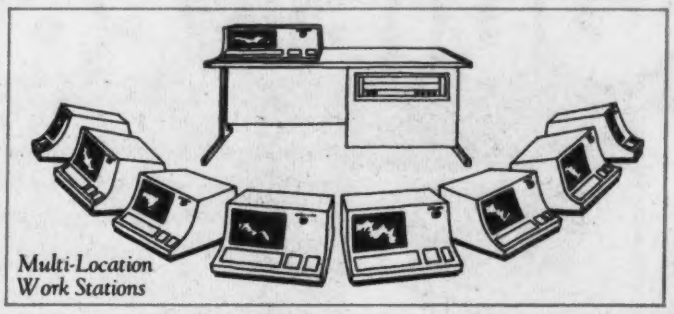
Dispersed Data Processing: An Idea Whose Time Has Come– Just in Time.

Dispersed data processing the Datapoint way offers a practical, convenient, economic way to get computing power out where the action in a business really is, out in field facilities where sales, purchasing, manufacturing, inventory and other important source documents are first generated.

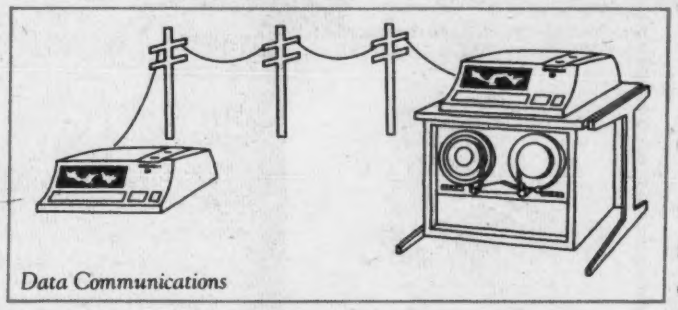
Many organizations today have costly central computers but find it difficult to make their power available to remote locations where it can be used most profitably. These central computers often operate only at a fraction of their potential. To solve this problem, Datapoint Corporation has pioneered and implemented the concept of dispersed data processing, an idea whose time has come, just in time, for maximum economy and efficiency at many businesses.



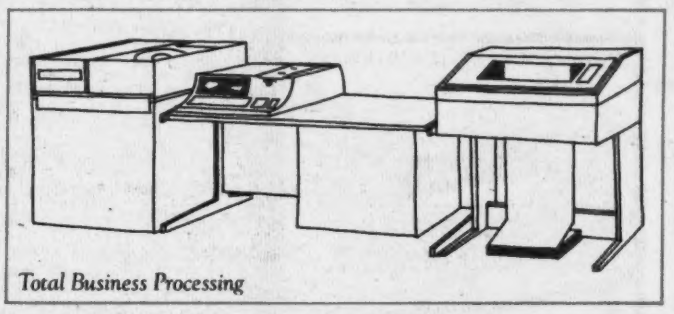
Intelligent Data Entry



Multi-Location Work Stations



Data Communications



Total Business Processing

Datapoint dispersed processing equipment integrates a data conversion/entry, data processing and data communications capability. It makes it possible for personnel in a company's field offices to capture, "package", and move data efficiently to a central computer, and/or maintain local data files and perform processing tasks without having to go to a central computer at all. With three fully programmable dispersed processors, the Datapoints 1100, 2200 and 5500, associated peripherals and complete operating software, system configurations can be easily tailored to the work load of each field office, subsequently adjusted and expanded as that work load changes. Further, Datapoint equipment interfaces readily with all standard central computers and line disciplines through proven emulation routines.

Typical application configurations include:

- Intelligent Data Entry–for field offices and other departments handling a heavy volume of data conversion and entry work, the new Diskette/1100.
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- Data Communications–for applications which require speedy transfer of large volumes of data between facilities.
- Total Business Processing–based on a powerful Datapoint 5500 processor and associated peripherals, providing a stand alone processing capability to field offices.

Datapoint dispersed processing systems are now at work in hundreds of organizations around the world. (Our total installations exceed 10,000 and purchase value of equipment shipped for sale or lease was over $66 million in fiscal 1974.) Could be dispersed data processing is an idea whose time is coming at your company. For more information contact the sales office nearest you or Datapoint Corporation, San Antonio, Texas 78284 (512) 690-7173.

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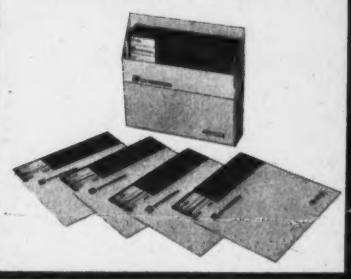

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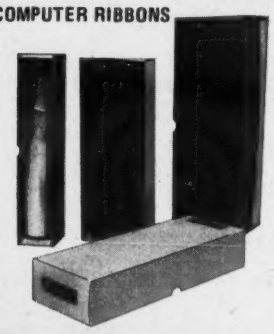

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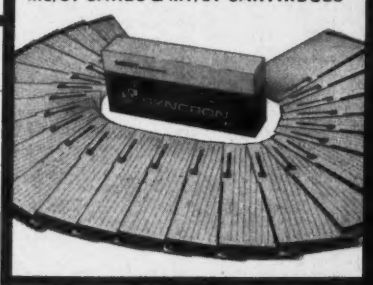

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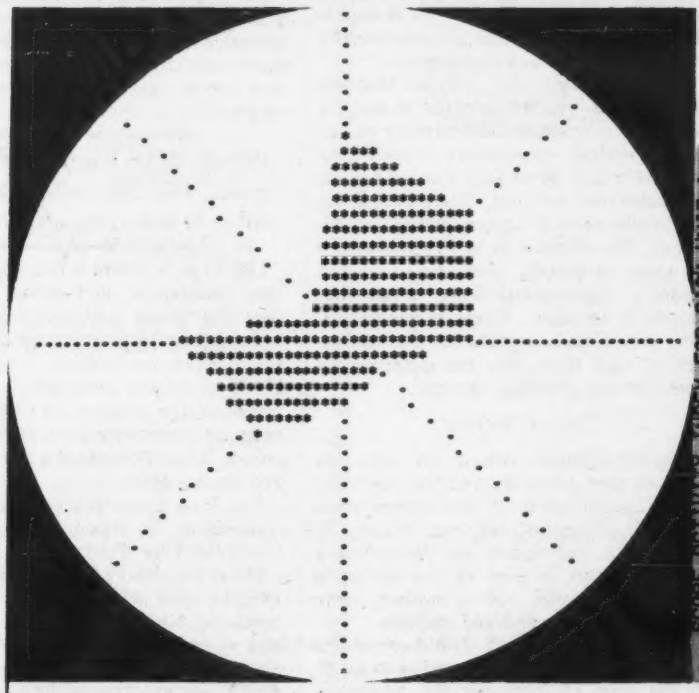

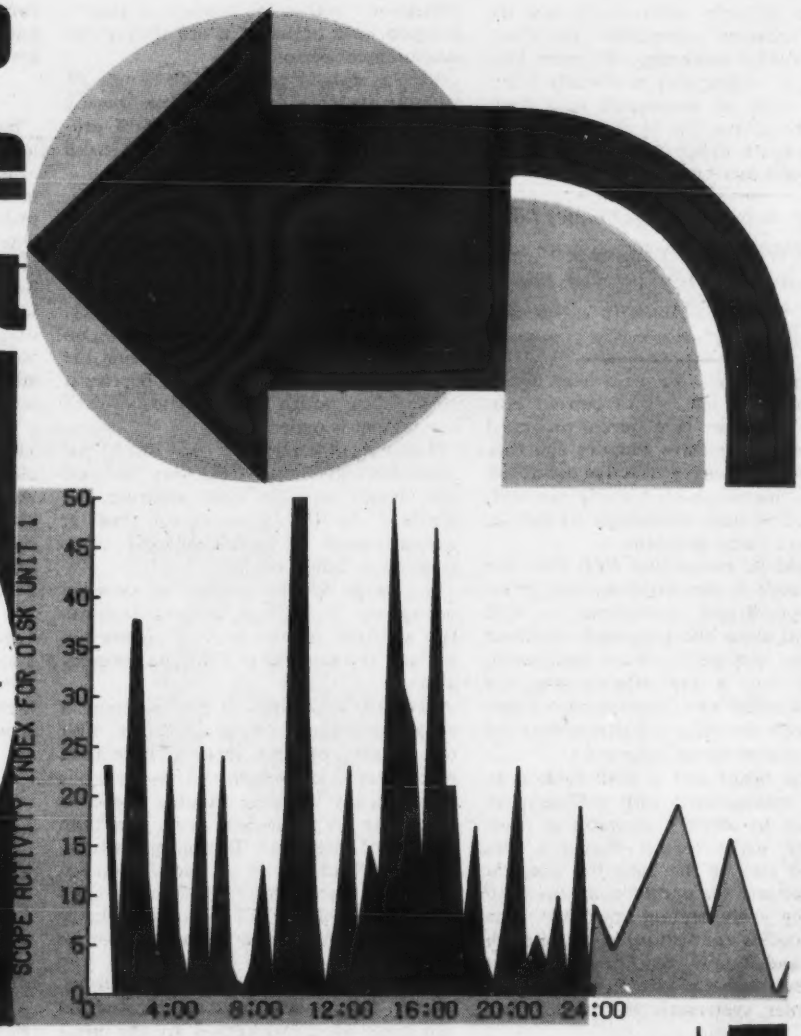

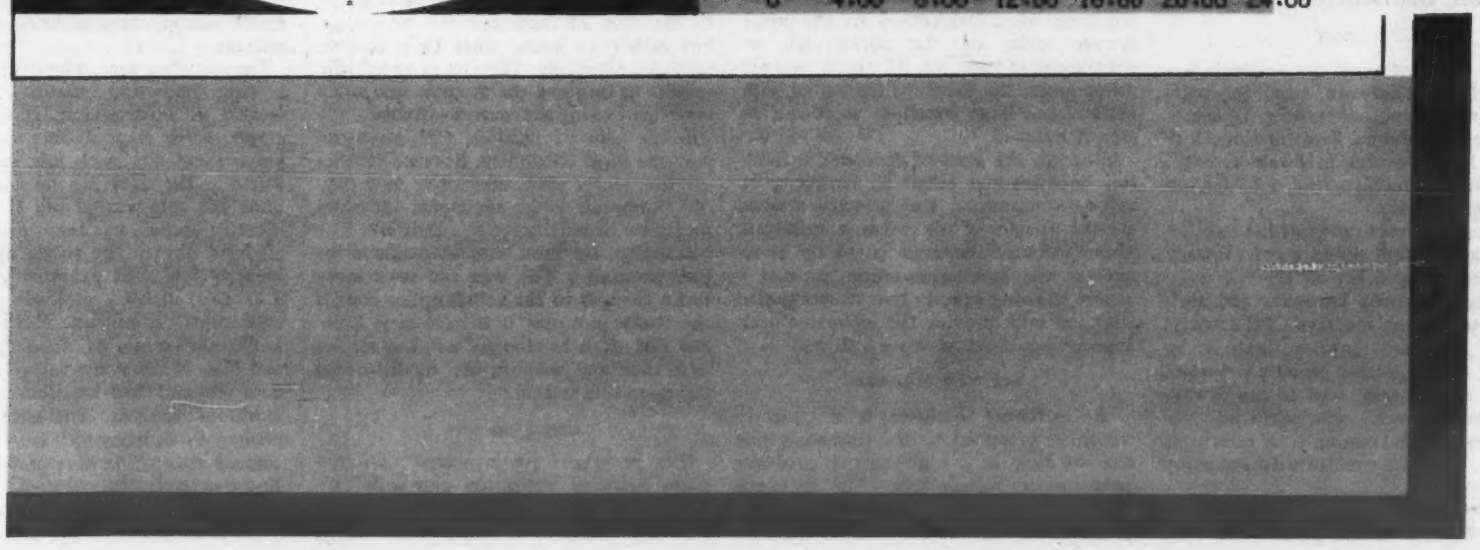

A Short Course on CPE

Knowing ABCs of DP Monitoring Tools Vital Today

By John J. Hunter
Special to Computerworld

Management no longer views DP as surrounded with mysticism, as it did a generation ago; it now sees it as a cost center, not a status symbol. For that reason, smart DP managers lean toward computer performance evaluation (CPE).

A recent study conducted by Auerbach found there are three prime reasons for performing a CPE study: to reduce costs, to attain better user charging and to provide better management information concerning DP performance.

CPE can help reduce DP costs by avoiding unnecessary outlays for equipment upgrades. This can be accomplished either by determining that requested equipment acquisition/expansion is not required or by improving the performance of existing equipment to the point that it can fulfill projected needs.

A CPE study can determine whether equipment expansion or acquisition is necessary by estimating hardware requirements to support projected software workload additions.

Another instance where CPE can be useful in reducing expenditures is in dealing with vendor marketing strategies. For example, a vendor may artificially limit memory sizes on processors so a user must move up the line to the next faster processor (with the associated increase in rental) to get more memory.

'Management no longer views DP as surrounded with mysticism, as it did a generation ago; it now sees it as a cost center, not a status symbol.'

CPE can help in two ways here. First, by providing an analysis of current programs, it can assure that current programs are not using excessive memory and that the job mix is making effective use of the memory. Second, such a study can indicate whether any advantages would accrue from a faster processor.

It should be noted that CPE does not always result in recommendations to reduce expenditures. Sometimes, a CPE study will show the projected workload cannot be met with current equipment, although this is the original plan (or hope). In either case, management is presented with the facts and alternatives and then must exercise its judgments.

The last major use of CPE tools is to provide management with sufficient information to identify operational problems and make several decisions. The tools can also be the basis for tying the DP center into the normal company cycle of setting goals, stating objectives, measuring success (or failure) in meeting objectives and, finally, reporting whether or not objectives were met to management in a regular, systematic and ongoing way.

CPE Tools

Three classes of tools are available for CPE analysis: hardware monitors, software monitors and accounting packages. As a general guideline, hardware monitors are best for measuring hardware activity, while software monitors do a better job measuring software.

Both types of monitors intrude into the other's domain, but the levels of accuracy and degree of capability differ.

For example, both hardware and software monitors can measure CPU activity, but the hardware monitor figure is inherently more accurate because it doesn't degrade the system, and it can always take measurements, even when the operating system is running with interrupts disabled. Software monitors do not enjoy these advantages.

The hardware monitor consists of probes, cables, logic plugboard, monitor and data recorder. Together, the monitor and recorder track the electrical pulses making up the data flowing through the machine.

As the computer system functions, pulses flow through pins or test points designed and located on the back panel for use by the vendor maintenance engineer. In effect, the test pins or points are "windows" which allow the monitor to look inside the system; each window opens on one specific thing. Normally, the customer engineer looks in the windows with an oscilloscope attachment which does not disturb the system in any way; thus the attachment is passive.

A hardware monitor functions in precisely the same way, although its internal electronics and capabilities are much superior to an oscilloscope. It attaches to a system by means of physical connections called probes.

Hardware monitors are used to measure CPU busy, CPU waiting, disk seek, disk data transfer, disk mount, tape busy, tape rewind and memory utilization. The level of component activity is called "percent utilization" and is the amount of time a component is actually in use during the measurement period.

For example, if the CPU is in use 30 minutes during a one-hour measurement period, it would be said to be 50% utilized. The same is true for Channel No. 1 if it is also in use 30 minutes.

If one wants to know when these utilizations take place within the hour, the issue of concurrency, or overlap, is raised. For example, if the CPU is in use for the first thirty minutes of the hour, and the channel is in use for the second thirty, the degree of concurrency is zero. If, on the other hand, both are used during the same 30 minutes, the degree of overlap is 100%, even though the utilization of each component is only 50%.

Memory utilization is an interesting measurement. Unlike CPU busy, we cannot simply take the time available and divide it by the measurement time. It would aways be 100% because some memory is always in use.

So, we go to the concept of memory occupancy. To do this, we must accumulate statistics on the level of memory in use and the amount of time the memory is in use.

Memory occupancy then becomes a weighted average level of utilization, with the amount of time spent at each level being used as the weight. To continue our example, say we were running a test for one hour on a machine with 1 million words of memory. During processing, 250,000 words are in use for 15 minutes, 500,000 words for 30 minutes, and 750,000 words for 15 minutes. Memory utilization (or occupancy) would then be 50%.

Another capacity measured is disk capacity. How much space is allocated but not used? How fragmented are the prime storage areas on the packs? By reorganizing records to fill these vacated prime areas, the overhead associated with maintaining large overflow areas can be greatly reduced.

Although the level of disk-seek activity can be measured either by hardware or software monitors, the capacity studies are the domain of the software monitors. Some software monitors go so far as to analyze the seeking situation, provide a report showing exactly how to reorganize files and even provide the estimated seek time savings if the advice is followed.

Software Monitors

The software monitor is a program which is appended to the operating system or runs as a high-priority problem program or system task. The software monitor can provide very accurate resource utilization data because it can read internal tables, operating system control blocks, status registers, memory maps and so on.

It has two great drawbacks: it degrades the system up to 10%, and it provides questionable CPU utilization figures because it cannot sample while supervisor interrupts are disabled. Therefore, it registers higher CPU busy figures in problem program state and less in supervisor state than actually occurs. The overall error, according to user experiences, runs around 10%.

'The operating system is a good place to look for performance improvement because it is large and frequently used.'

The objectives of measuring system software components differ from those of measuring hardware components. Instead of levels of hardware utilization and concurrency, measurements are performed to determine utilization and hardware requirements. System software components commonly measured are operating systems, support software and user programs.

Operating System

The operating system is a good place to look for performance improvement because it is large and frequently used. Such measurements are done partly for information and partly for action.

As information, they tell DP management how much of the resources are devoted to the operating system and also identify particularly inefficient sections of code, which could lead to asking the vendor for improvement. If this is impossible, one might consider a commercially available software as a replacement.

The study might also indicate that the placement of certain routines should be altered. For example, the number of operating system subroutines supplied by the vendor may be so large that all cannot be made core resident. Therefore, some will be placed in secondary storage, usually disk. The decision as to which modules go where is usually made based on the vendor's recommendations when the system is installed. These recommendations may have been right for the installation at that time, but the installation's workload has probably changed.

Support Software

Support software falls in the gray area between user programs and the operating system. Although run in the system much like user programs, they are written by the vendor and appear to the ordinary computer user as part of the operating system. Examples are compilers, communications programs and utilities.

With compilers and communications programs, the user is not looking to modify the code of these complex programs, but rather to know what they cost in terms of resources. The aim is to ask the vendor to improve the program and/or to investigate using alternative software.

In the area of utilities, CPE gives the user the most flexibility. Because utilities are frequently used, they offer high payoff potential. What additional measurements are usually taken for utilities?

Basically, the same measurements as for user programs. The user can reasonably make changes to the actual utility code if the study indicates it is necessary. Utilities can often be changed without vendor assistance and without fear of disturbing the operating system.

User Programs

User programs are measured to determine resource utilization and code efficiency. Resource utilization measurments record and report the amount of time a program uses each of the resources it requests such as core, tapes and disk.

Sometimes the utilization is zero, because the programmer allowed for the worst case. For example, the utility may request eight tape drives, even though it normally needs four. If the installation is short of tapes and the number of runs that need all eight tapes is one in thirty (monthly closing), perhaps the center will ask a programmer to change the utility.

Another important aspect of resource analysis is to determine I/O activity and block sizes. Sometimes a program requires 10 more I/Os than necessary because the records were improperly blocked.

Code efficiency analysis involves measuring the amount of time spent in each identifiable section of code. A commonly observed phenomenon in business indicates that 20% of the customers account for 80% of the business volume. The same often holds true for programs.

Accounting Packages

Most modern operating systems maintain statistics showing resources requested and utilized by jobs. By passing this data through data reduction routines, the DP center can bill individual users and also gain some insight into which jobs best use or misuse system resources. Armed with such information and a little common sense, the DP manager can shuffle jobs to obtain the best possible mix.

The best known statistic gatherer is IBM's System Management Facilities (SMF). In all, SMF captures 31 record types, but five types are of real value in analyzing efficiency.

The Type 1 record contains system wait time. This is written every 10 minutes and shows the amount (in time) of waits since the last record was written. This data can be used to estimate the OS CPU overhead.

'In all, SMF captures 31 record types, but five types are of real value in analyzing efficiency.'

The Type 4 record is created when a job step terminates, and shows CPU active time, initiation and termination times, main storage requested and used. I/Os are summarized by address, type, class and EXCP count for each device. EXCP is the count of the number of times a channel program specifying that device was executed; thus, it counts the physical I/Os to and from a device.)

The Type 5 record is created when a job terminates; it simply summarizes and totals the Type 4 data.

Types 14 and 15 describe each data set utilized by a job step. It shows data set name, organization (direct, partitioned and so on), record size and format, block size, number of devices the data set is on, EXCP count, unit address and channel address.

The recorded data, when passed through a data reduction routine, provides a wealth of information. It can, for example, show elapsed time and CPU time percentages for each job and job step. Further, the data can be used to determine the core wasted and at what times; identify programs that need blocking changed due to the access method used; identify jobs that excessively open/close data sets; identify multiple extents (file extentions); summarize EXCP data to obtain total counts by device and channel and also identify the most highly active data sets and their locations; and perform workload analysis. The latter is accomplished by utilizing step records to isolate elapsed time, CPU time and region/partition size requested and used.

Hunter is project editor for Auerbach Software Reports.

Monitor Helps 'Insure' Applications, Monthly Tuning

Special to Computerworld

LONDON, Ontario – Even with the use of its IBM 370/168 VS system, the ability to ensure maximum performance and optimize resources is a prime concern at London Life Insurance Co. here.

The company acquired the 370/168 in September 1973 because its workload had outstripped the capacity of its 360/50 and 360/65, according to Ronald W. Murray, London Life's senior technical analyst.

Based on operating history and present trend, the workload should continue to grow at a rate of 5% to 9% as the company expands into new insurance areas and gains additional clients in existing and new areas, Murray added.

To ensure that the system is operating at its peak and all resources are being properly allocated, Murray and his group run the Boole & Babbage, Inc. Configuration Utilization Evaluator (CUE) software monitoring system every time a new application is added and at least once a month to "tune" the hardware.

"We use the software monitor to assist us in isolating heavy page rate areas and to ensure that all are being handled properly and in a timely manner," he commented.

"It also assists us in making certain we have fairly equal device utilization and that we have the proper placement of our data sets on particular volumes," he said.

Better Channel Utilization

Murray noted proper channel utilization has been an area of key concern as well as a common source of problems for London Life. "Shortly after our system was on-line and operating, we used CUE and, after studying the reports, we found our channels were out of balance by about 20%," he said.

"After making some software adjustments, we were able to balance the channels and achieve much better throughput from the system."

Murray commented that visual monitoring of the system and its operation is extremely difficult because of the length of time necessary for the observation before any determinations can be made. However, with a software monitor, the firm is able to run the monitor on the system and receive condensed time reports to provide the objective overview statement. From this statement, actions can be taken to improve performance.

"Over a period of time studying the reports," Murray noted, "you can see trends and places where specific peaks are hitting. Then you can go in and make specific changes to level out the peaks or to short-circuit problems before they arise."

The CPU and I/O overlap reports have been of considerable assistance to Murray's team because they let it see what is going on over the specific channels. With only simple changes, the DP shop has been making significant savings in this area by keeping the CPU use at its optimum and by reducing waiting periods, he said.

"We've found that it was easy to improve our efficiency by 10%," he said.

In addition to handling hardware problems, the software monitor has assisted London Life by pointing out some software problems. "In one instance, we had a particularly high average page service time per request, about 125 msec," Murray stated.

"By studying the reports, we could see where the problems occurred and, by tracing the software back against the reports, we located the specific program locations which were causing the problems. Then with a few very minor program rewrites, we eliminated the software bottleneck and were able to reduce our average service time per request down to 70 msec."

All in all, Murray estimated the software monitor has assisted his department in improving the system's efficiency by 15%. Unfortunately, this improved efficiency is not easy to maintain.

"Every time we add a new application – and we are constantly adding or subtracting applications – there is an impact on the system's efficiency. We've also found that channels, our need for direct access and our volume activity during certain periods will dramatically affect the system's efficiency. If you don't keep on top of it constantly, your system's efficiency can drop by as much as 10% in less than a week," Murray said.

"The IBM VS system has many overall and individual advantages for firms such as ours involved in a multitude of areas," Murray contended, "but it requires a greater degree of sophisticated monitoring and measuring to ensure that it provides all of those advantages to us and our customers."

System Gives Early Warning Of Bottlenecks

Special to Computerworld

ST. LOUIS – McDonnell Douglas Automation Co.'s DP headquarters here not only provides complete DP support for the firm's five major divisions but also offers commercial DP services to clients in all types of industries via an extensive telecommunications network.

As a result, operating efficiency, maximum throughput and minimal response time are prime operational requirements.

The firm presently operates two IBM 360/195s and two 370/168s, as well as a complete range of supportive peripherals, according to Betty Polczynski, senior section manager.

To measure all of the systems' performance, the firm uses Boole & Babbage's Configuration Utilization Evaluator (CUE) software monitor. The monitor helps the firm quantitatively evaluate the overall hardware performance of the firm's systems and is used in conjunction with a hardware monitor and performance reports based on SMF data, she said.

CUE is run twice daily during the operation's two peak-load periods in the morning and afternoon. By doing this, the center obtains early warning on problems or bottlenecks which might occur, Polczynski said.

She added that the software monitor also helps the center develop trends regarding system performance and permits

(Continued on Page S/6)

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The Scheduling Game: A Play of Comedy and Tragedy

By Anthony Constable
Special to Computerworld

At 9:30 on the morning of Monday, April 1, 1978, Fox Silver, technical sales manager for scheduling products with Performance Improvement, Inc. of Graveldump, Ohio, arrived at the home office of the Monolithic Manufacturing Co, (MMC) to give a presentation of his products to the data center line management.

The presentation had been arranged for by a two-years-out-of-college technical man with management aspirations called Bert Byte who was convinced MMC's data center needed some form of automatic scheduling to plan and schedule workloads for its six IBM 370/168s and the 600 people involved in the ancillary functions such as data entry.

Silver completed his presentation, which appeared to be well received, at 11:15 and then he; the director of data processing, Mr. Bright; the computer room manager, Mr. Glum; the scheduling manager, Mr. Mendacity; and Bert Byte retired to Mr. Bright's office to talk business. It went something like this:

Silver: I hope you all enjoyed my presentation.

Bright: Yes, it was excellent. The subject matter was definitely very timely. In fact, I had a conversation with my counterpart at the Medium Manufacturing Co. on this subject only last week.

'If we could only get service from the preprocessing workstations on time, big JES3 would be able to produce for us every time.'

Silver: Oh really! Were you aware Mr. Brighter at Medium had installed our Bucksaver scheduling system, and saved great amounts of money in only six months?!!

Bright: Yes, I do recall something along those lines.

Silver: Well, with Medium having such great success with our system, when will you be ready to install the package?

Bright: Hey now, wait just a minute! You're making an assumption that *we* need help. You seem to forget Monolithic is three times the size of Medium. They only have two 168s. The problems are quite different. Besides all that, we run our 168s under JES3 and, as I understand it, that is all the scheduling necessary. Would you care to comment on that, Mr. Glum?

Glum: Yes, that's exactly right, Mr. Bright. If we could only get service from the preprocessing workstations on time, big JES3 would be able to produce for us every time.

(Interruption while Bright answers a telephone call which results in a heated discussion for a minute or two.)

Bright: (Sigh.) That was Bean Counter in Accounting complaining as usual about not having received the customer billing run on time. By the way, why is that work late? Do you have any idea, Mendacity?

Mendacity: Well sir, as you know, data entry under Mr. Harem is not part of my responsibility and he delivered the input late. Then we had to rerun Phase 2 of the billing run because it used last month's data due to Phase 1.5 not having been completed, which would have supplied this month's data. Then because Phase 2 had run producing 3 million statements, all of which were wrong, we ran out of Form 6318 and had to order some more. However, we got the run done and now its awaiting decollation, but Mr. Mound in decollating says he's @$%!!&!! if he's going to stop work on the payroll job and do the @$%!!! billing work.

Bright: Well, I can understand Mr. Mound's dilemma. He made the right decision.

(Interruption while Bright takes another call, this time from Mr. Huge, vice-president for finance. The conversation went like this:

Huge: Where the hell is that billing run, Bright?

Bright: Well, sir, we had some technical difficulties with the run, but I can assure you everything is under control now.

Huge: Do you realize that for every day that billing run is late, it costs us $3 million out of cash flow? We increased your budget 53% last year to make you more efficient. We delivered – where is your side of the bargain?

Bright: Well sir, we do our best, but the users don't seem to understand our problems.

Huge: Mr. Large, the vice-president over at Medium, tells me his man in DP has introduced a scheduling system that has solved all of their problems – why haven't we got one?

Bright: Well, sir, I'm glad you mentioned that, because, as it happens, Fox Silver from Performance Improvement, Inc. is here at this very moment – and we are consummating a contract for a scheduler.

Huge: Throughout this damn company, we've been scheduling for years to feed our production lines and now you just discovered a scheduling system. Tomorrow you'll invent the abacus!

Bright: Sir?

Huge: Never mind, just get that billing done!!! – (Click!)

Bright: Wow! I'm really glad you were here today, Silver.

Silver: Yes sir, so am I. It took Bert two months to set up this presentation.

Bright: Ah yes, Byte. Why didn't you bring this, er . . . Bucksaver system to my attention earlier?

'I saw an obvious production line in the data center . . . but . . . there was no common communication between these workstations and no coordinated plan for production scheduling.'

Byte: Well, sir, I finally managed to convince Mr. Bit, the manager of systems programming, there was more to the problems of the data center than unloading and reloading PDSs. And then you were away on that three-week management seminar in Tahiti.

Bright: Yes, I have been busy lately but, tell me Byte, what made you so interested in scheduling?

Byte: At college I majored in industrial engineering, and the production line concept was always stressed as the key to productivity. When I came to work here, I saw an obvious production line in the data center, where jobs classically went from say, data entry to the control group, then to the computer room and so forth, but I found there was no common communication between these workstations and no coordinated plan for production scheduling. So, therefore, there was no control possible, because nobody knew exactly what they had to do and in what order it had to be done.

Bright: Were you aware we had a scheduling group run by Mendacity here? Are you saying his group does not schedule?

Byte: No sir, I'm not saying Mr. Mendacity doesn't schedule. Each day his group puts together a list of jobs that have to be run the next day on the CPUs. However, he cannot state on that list the order in which the jobs have to run, when they can begin and when they must be finished to get the output printed, decollated and delivered to meet the user's deadlines.

What we need is a way of describing the flow of each application through *all* of the workstations to produce a contention-free schedule for each workstation that allows us to meet the user's time requirements. In addition, it needs to be automated because then the scheduling group can spend their time expediting the work to insure the productivity goals are met!

Bright: What do you have to say about that, Mendacity?

Mendacity: It sounds okay, but it seems like a huge task to put together all of that data. It hardly seems worth it.

Bright: Do we have all of that data right now?

Mendacity: No sir. Our documentation is really out-of-date.

'It sounds to me like we have been running a Cadillac of an installation with a Model T transmission.'

Bright: Do you mean to say there is no standard documentation explaining what we have to do and how we have to do it? How the hell have you been scheduling?!!!

Mendacity: By gut feel, sir.

Bright: It sounds to me like we have been running a Cadillac of an installation with a Model T transmission. Silver, you have got yourself an order.

Footnote

In the U.S. today, there are more than 5,000 medium to large DP installations. Around 100 of these have some form of automatic scheduling system. Around 75% of these installed systems schedule the mainframes only.

That is rather analogous to Detroit auto manufacturers scheduling engine production without gearing that to the production of the other components. We have to begin using the computer to plan and schedule the complex workloads and resources in the data center itself.

Will your installation be doing it by April 1978?

Constable is scheduling product manager at Tesdata Systems Corp.

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Chargeback Schemes Allow Users to Evaluate System

Chargeback systems are one method by which the ultimate end user of DP services can judge the performance of the computer room, but too often those charges are more a cause of animosity than of enlightenment.

Often this animosity is caused by a lack of communication between the DP shop and the end user or by inconsistent charges stated in terms not well understood by the ultimate user of the service, according to *EDP Performance Review*.

"One of the problems most frequently cited with respect to chargeback systems is the lack of simplicity in explaining charges to users, who typically have little knowledge of or appreciation for the complexities of computing equitable charges for computer services," the publication noted recently.

Therefore "there is often an underlying feeling that DP is the villain in this game and that charges are not fairly assessed.

"Furthermore, it is frequently difficult for the user to forecast what his costs will be, particularly when charges are not consistent from month to month," it added.

Units of Activity

To overcome the problems created by such chargeback schemes, the publication suggested equating a user's DP costs "to some unit of activity fundamental to his own functional responsibility."

For example, *EDP Performance Review* noted that the cost of running a payroll could be related to the number of employees – a number well known to the payroll department and one that could be forecast regularly by that department.

Therefore, the publication suggested that the chargeback levied by the DP department be based on some agreed-upon "application unit," and not on actual resource utilization. In the case of the payroll system, this unit could be a set cost per employee, it suggested as an example.

"Not all applications are adaptable to this approach, of course," the publication said "particularly if they are not unit-oriented, but some unit or combination of units can usually be found for most business DP applications."

The justification for this approach can be seen by looking at the way commercial products are priced.

"One would never think of adding up raw materials costs, labor costs, overhead and a profit margin to set a price for every item that goes out the back door – not, at least, for any product sold repetitively and in any quantity.

"When the product is finally marketed, it is given a firm price the customer can count on," *EDP Performance Review* noted.

"Unfortunately, the approach taken by many job accounting systems is exactly equivalent to the process" that would be involved in individually pricing all products: "Namely, the cost of resources used, manpower, overhead and sometimes even profit factors are individually added up to arrive at charges for each job."

Where application units can be devised, "we should not expect the users of our DP services to put up with charges based solely on this week's cost of production, any more than we would expect the buyers . . . of any other product to sign a purchase order without having a firm price," the publication said.

No Perfect Unit

The first step in the process of developing such a system is for the DP department and the end user to agree on an acceptable application unit, the publication indicated.

"It should be stressed here there is probably no perfect application unit in any application, nor is this an approach that will produce precision costing," it said, adding that "there very likely will be some error involved, particularly when fixed vs. variable costs and nonlinear cost relationships are considered."

"Some approximations and compromises may have to be made, and unit charges may have to be changed from time to time, but, in the long run, the advantages in forecasting ability and improved relationships between DP and the user departments would seem to justify it," it said.

Establishing Charges

In very basic form, there are five steps that have to be taken to establish the application unit charge.

First, rates must be established for each chargeable resource, just as they have to be established for any other chargeback scheme.

Next, each application has to be measured in terms of the chargeable units, and all programs that make up an application should be measured individually. To avoid cyclical fluctuations, the results of several runs should be averaged.

Third, standard costs for each run based on the measured usage should be developed. This will establish a base line for the application as a whole on which future charges can be based.

Next, the total application costs should be accumulated by multiplying the individual run costs by the appropriate frequency.

Finally, the application unit cost can be calculated by dividing the total cost by number of units and adjusting for the appropriate charging period.

Chargeback then simply becomes a matter of multiplying the number of units by the predetermined price each month to give the user an understandable figure and ease the communication problems between the DP department and the ultimate users.

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Understand 'Zap' Words

Strategy First Step in Successful Hardware Monitoring

By Stanley E. Rubinson
Special to Computerworld

The term "hardware monitor" has been popping up more frequently in the last few years, not only in the U.S. but, in fact, throughout the whole world. Recently, we have seen the beginning of new organizations, committees, etc. referring to computer performance evaluation (CPE).

With all this noise, interest and commentary, it would seem everyone within the computer industry would be well-versed in the monitoring technology.

The sad fact, however, is that only a select few individuals are knowledgeable, and they are counted in the hundreds within an industry staffed by the tens of thousands.

An idiosyncrasy of our industry is the use of "zap words", i.e., unique terminology whereby the user conveys the impression he understands the subject he is talking about. Within the field of hardware monitoring, some of the hot zap words are: "general profile," "strategy" and "methodology."

The discrete definitions for these terms are as varied as the personalities of the individuals using them. These terms must be removed from the zap list and made to refer specifically to work that must be accomplished.

A number of items must be considered before a company commits itself to the investment required to accomplish hardware or software monitoring. This investment goes beyond the actual measurement equipment itself; it also includes an investment in manpower.

Strategy First Step

The first step in a successful measurement project is the strategy. This includes the definition of the work to be accomplished, i.e., the generic terminology of the activities to be captured and a clear definition of the objective to be achieved, including a target date for completion.

In defining this strategy, it is imperative to retain a sense of balance within the suggested points of measurement between the useful and useless. Too often, a group will insist on obtaining a map of program activity while being fully aware the shop would prefer to double the budget rather than attempt the simplest change to a production program. Modify an operating system? Horrors – unthinkable – forget it!

The generic terminology of activities should include the broad scope of useful items to be investigated. Such items would be:

- Investigation of any bottlenecks within the random-access area.
- Determination of where dollars can be saved without hurting throughput.
- Investigation of the necessity of upgrading to a larger CPU and determination of potential improvements.

The strategy session can progress from this point to include the details necessary to obtain the stated objective(s). For example, the first item above would require an outline of the disk channel configuration to determine where the multiple paths might possibly conflict, referred to as contention.

Methodology Session

The project can then proceed on to the methodology session. This would include the finite details of the type of tool to be used, singly or in conjunction with others and, in the event a hardware monitor is designated, the necessary probe points to be determined.

The logic panel must be designed to include the type of data required. Again, in the case of the first item above, the logic would include a capture of the contention occurrences. This should consist of both the count and time interval which would then allow determination of the average contention time, as well as the time of day the occurrences are most severe.

During any hardware monitoring session, the plan of attack should always include a systems overview or general profile to allow quantification of the specific data to a given set of circumstances. "General" means something that involves or is applicable to the whole. A profile is a presentation of something in outline.

Concurrency Capability

The industry is primarily interested in computers referred to as the "third generation." This typically is defined as a system that has the capability to concurrently compute and input/output.

Another loose definition includes multiprogramming or multitasking or multiprocessing. This adds up to the same thing – the loss of control over what the system does and when.

Current system technology is typified by loading a mix of production jobs into the system and sitting back while it schedules and executes the tasks. The payoff of the third-generation system is within the concurrency capability. Therefore, a general profile should address this function.

Four Ingredients

There are four major ingredients to this functional capability:

- CPU only – Time the compute functions are active and the I/O functions are inactive.
- CPU and any I/O – Payoff time, both compute functions and some type of I/O active concurrently.
- I/O only – Computer idle while an I/O function is active, commonly referred to as CPU wait time.
- System idle – Both CPU and I/O function inactive.

Quite obviously, the sum of the first three items above would be referred to as "system busy"; however, effective system time would equal something represented as a differential between CPU and any I/O and the sum of (first generation-type operation) CPU only and I/O only.

The observation of these four points over a given period of time would probably become repetitive. For example, first-shift operations may look alike but be unique when compared to third-shift operations. Once this cycle has been determined and a pattern clearly defined, the data can then be put to use.

The most critical mistake that can be made in measurement is to take a short interval set of data and run down the hall proclaiming the problems have been found. This will invariably lead to a case of "egg in the face."

Subsets of Profile

Beyond the four major ingredients of a general profile, there are many subsets that can amplify the reason behind the measurement obtained. In the case of I/O only, it would be desirable to determine which channel or peripheral is active during those instants in time. At this point, it becomes obvious that a measurement session could capture sufficient data to answer the questions stated in the objectives and point out additional areas of merit for further investigation.

When what should be measured is not readily apparent or the details of the measurement session are unknown, it is much better to go with a general profile only and allow the actual data to point the way to the details that would be pertinent. The alternative to this method is to spend time and money on suppositions that may prove false.

Many Benefits

The benefits of hardware measurement of a computer system are many-fold. It presents an accurate accounting of the performance and, in doing so, it does not alter or affect the system while the data is being collected.

Beyond this, a hardware monitor can obtain measurements at any point, place or time within the system. This includes many items that cannot be captured via programming.

The one drawback to hardware measurement is the lack of ability to apply the measurements directly to a program function within a multiprogramming mix. This problem has been addressed, and several variations of hybrid software trap to hardware monitor input have been tried.

The net gain in data attributes has not warranted continued research. Possibly the future may demand this technology and be willing to pay the price for the custom work which will be required for each unique system.

Rubinson is technical manager of the Comress Performance and Evaluation Division of Comten, Inc.

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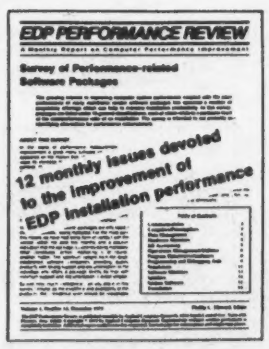
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Early Warning System Spots DP Bottlenecks

(Continued from Page S/3)

it to analyze how various hardware and software changes have improved or affected the entire system.

For example, several months ago, McDonnell tried IBM's Time-Sharing Option (TSO) swap data set and OS job queue on one device and measured the unit's performance. It found time-sharing response was improved and there were no problems with utilization or batch throughputs, she said.

Faster throughputs and better system utilization was also achieved by revising the MVT dispatching algorithm, she said. McDonnell implemented a round-robin technique so that, after a set interval of elapsed time, the top task in the dispatching queue was placed at the bottom of the queue.

This allowed more tasks to initiate their I/O requests and to receive CPU control when they were ready. As a result, the multiprogramming level was increased by 12%. At the present time, the firm is tuning the round-robin technique by adjusting the elapsed time interval to provide the required service while minimizing overhead in this area.

Polczynski claimed that only by the use of CUE and other quality software monitors can a DP operation quickly and easily measure the impact of its software enhancements on the overall system's operation.

The systems are operating at a high utilization rate, and this is achieved by balancing its systems, William A. Tate, systems programmer, noted.

One of the key reasons the firm continually uses CUE to monitor the system is it can track activity to a specific device level to make certain they keep the channels and CPU levels in balance for all applications, Tate said.

"Since none of our CPUs are dedicated to any single application," he said, "it is important that we achieve the greatest application optimization possible. We have to function as a highly efficient profit center for the corporation."

Problem Prevention

Tate also noted a recent example of the value of daily monitoring. CUE reports showed an increase in the logical channel queue depth for the ASP queues. An examination of the usage for all devices on the channel led to the identification of the data set with high activity. The data set was moved to another channel, which eliminated the bottleneck. If the information is not available to identify potential problem situations, they tend to grow into serious problems, he said.

Since a DP operation is in a constant state of flux, with new applications and hardware constantly being added, a means of measuring the system is vital, Polczynski and Tate said.

"We feel you have to monitor your performance today," they stated, "so you can determine what has to be done tomorrow to keep pace with your customers.

"If you are fortunate enough to be able to add additional hardware at will, you probably don't need to measure, but, as an alternative, you have to measure to stretch the effective life of existing hardware as far as possible. Then, with the clear-cut documentation, you can show management why more specific types of hardware are needed."

No One Correct for Everyone

Every Shop Needs 'System Performance' Definition

By Saul Stimler
Special to Computerworld

A surprisingly large number of companies, including those with hardware and software monitors, are still not realizing the cost savings and more effective planning achievable through the disciplined use of performance evaluation, measurement and improvement.

One of the difficulties is the inability to meaningfully define and communicate what "system performance" is.

There does not appear to be any one "correct" definition for performance. Therefore, one has to be developed. Any proposed definition should:

- Be clearly understandable by all who need to communicate.
- Enable the expression of performance as meaningful, numerical values.
- Be useful in the solution of real-world problems.

Satisfying User Requirements

To arrive at a suitable definition, a DP system can be viewed as a production facility which is required to process each day's work that day and to complete each user's work on time.

From this viewpoint, performance is a measure of how well a system is satisfying the requirements of its users. It contains two parts – a measure of how well a system is processing a day's work and how timely the system is in completing each user's work.

To quantify performance, two groups of specific criteria are set up, one to quantify how well the system is processing a day's work, the other to quantify how timely each user's outputs are. Throughput rate, one of the important criteria in the first group, is defined:

$$\text{Throughput Rate} = \frac{\text{Data Processing Work Successfully Completed}}{\text{Wall Clock System Time To Process the Work}}$$

To illustrate the use of these concepts, assume that, in a real-time inquiry system to be evaluated, each inquiry requires single video screen output. The unit of DP work becomes the receipt of the inquiry, processing that inquiry and the display of the response for that inquiry. If, in a 10-hour period, 10,000 inquiries were processed, the throughput rate would be 10,000 inquiry/10 hours or 1,000 inquiry/hour. This is the "day's work in a day" portion of performance.

Response Time

One measure of timeliness is response time. Assume the average response time for the 10 hours was three seconds. The performance of the system during the 10-hour evaluation period would be 1,000 inquiry/hour with an average response time of three seconds.

Any evaluation period can be chosen. For example, suppose that during the busy hour 2,000 inquiries were processed and the average response time was four seconds. The performance during the busy hour would have been 2,000 inquiry/hour with an average response time of four seconds.

To quantify the performance of systems, it is necessary to define three basic system classes: batch, real-time and interactive time-sharing. The same set of performance criteria is used for all classes of systems. However, the specific unit of DP work is different for each class.

Comparing Performance

Comparing the performance of two different systems or of the same system under different conditions is one of the important uses of the evaluation discipline.

Suppose additional terminals are added to the inquiry system considered above, and during the busy hour 4,000 inquiries are processed with an average response time of six seconds.

What is the relative performance? The busy hour throughput rate was 2 times greater and the busy hour response time 1.5 times longer after the terminals were added relative to the performance before adding the terminals.

How much "better" was the performance after the terminals were added? This is a purely judgmental question. Quantitatively, the 2 and 1.5 are the only meaningful numerical values useful for comparison. However, if the functional specifications required that the average response time not exceed 5 seconds during the busy hour, then the performance with the additional terminals was unsatisfactory.

Stimler is president of Stimler Associates, and author of Data Processing Systems – Their Performance, Evaluation, Measurement and Improvement.

Some Measurement Limits Put DP Managers on Spot

By Vincent J. Bannan
Special to Computerworld

Computer performance aficionados often unknowingly put the operations manager on the defensive as they report to upper management that the CPU is being utilized to 60% of its capacity, or the tape drives are being used only 70% of the time, or the channels and CPU are busy 35% of the time.

It is implied by these figures and certainly concluded by upper, nontechnical management that all the good measures should be 100% – if Operations only knew what it were doing.

Very little has been written and precious little is done in practice to define the true limits of capacity in the man/machine relationship such as exists in computer operations.

Certainly, the ability to use the hardware and software resources is limited to the individual resource requirements of the production and test programs which Operations can run. But there are more limitations than just these.

The predecessor relationships of large production systems often do more to prevent the full use of available resources than any particular peripheral shortcoming. The unavailability of input data also prevents higher utilization figures. Service and response demands by management for certain unique and important reports again must be juggled by operations management and, in the juggling, theoretical capacity must be sacrificed.

To draw the logical boundaries of computer capacity, it is not enough to look at CPU cycles, maximum paging rates, core limitations, channel speeds, arm movements, peripherals device availability and operating system idiosyncrasies.

Nearly every large data center I know of could exist with less equipment if it did not have to worry about such items as predecessor relationships of jobs, due-out times of reports and data availability restrictions.

To meet these demands, more equipment is necessary. It should be clear this increased capacity is necessary because of deadlines, service times and input delays – things that can't be measured by hardware or software monitors. Graphs and diagrams leave unsaid the impact of these factors.

Imagine an "n" dimensional mathematical space where the boundaries of capacity include all these factors, and they change shape on a time axis. For any given work day in a data center, the space encompassed is the theoretical "best" schedule of available jobs.

This is the only direct measure of the capacity of the computer system. It is simply its ability to do work.

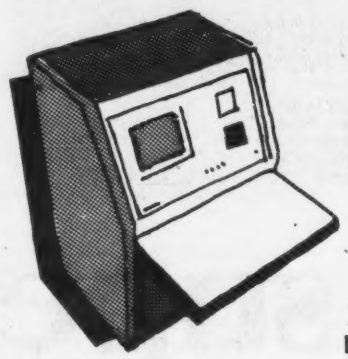
The ability of operations to fill this planned schedule with the actual performance during the day constitutes the work done. To the degree that they fall short of the planned capacity, they are underutilizing the system.

While it makes little sense to measure capacity which ignores all the boundary constraints, there is more to this story than simply better performance measurement. There is the harm being done by giving only part of the solution to management.

While we can continue measuring a capacity far beyond our reach, I see the operations manager placed in the difficult position of trying to explain this technically complicated problem to upper management. He is more often in the position of alibiing, of telling war stories, of matching complaints and never quite grasping the entire concept with which he is wrestling.

It goes without saying that this is operations management's responsibility, and I agree wholeheartedly with that contention. But until operations management learns the true dimensions of its problem, I think those of us who are concerned with computer performance should broaden our perspective of the problem and recognize the limitations of our measurements.

Bannan is president of Value Computing, Inc. in Cherry Hill, N.J.



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2 We eliminated the complexities and other disadvantages of hardware monitors.

3 We married the advantages of both hardware and software monitors together in an on-line dual processor hybrid system.

4 We added over 20 patented ideas of our own.

5 We called it the DSP-1

6 Best of all we made it easy to buy, less than 30K installed.

7 No specialized personnel are needed to operate this system. Regular operators and programmers can perform all the tasks of the DSP-1 with ease.

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How to explain performance measurement results in just 60 seconds.

As you can see, the chart is a super-simple way to show exactly what computer performance measurement is all about.

It's the kind of report, for example, that a financial executive understands immediately. He can see in dollars and cents what's being spent for the total computer system. But it also shows how much goes for average workloads. How much for peak periods. How much for unused capacity. It's a management report resulting from Tesdata measurements, but it is only the beginning of what measurement really provides. The report points out the glaring problems. With sophisticated measurement tools you can then fine tune the system to improve the overall operation.

Without measurement, there is absolutely no way for you to know how efficient (or inefficient!) your computer system happens to be. Without measurement, you can't even begin to control cost much less manage and schedule the d.p. operation the way it should be managed in these times.

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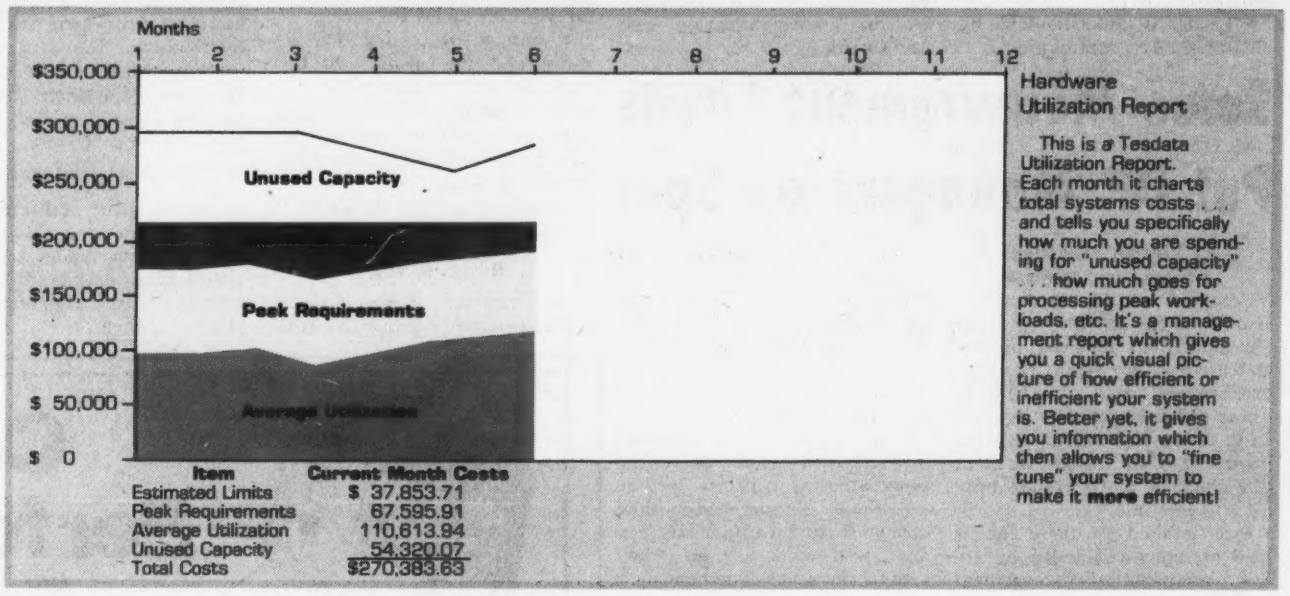
Five years ago, computer performance measurement was an interesting idea being pioneered by Tesdata and a handful of customers. Today more than 350 major corporations and government agencies have leased or purchased Tesdata hardware monitors or used our services to improve the performance, capacity, response and efficiency of their systems.

Measurement has become a management necessity in every size operation. It's the only way data processing managers can cope with meeting work schedules, controlling costs, budgeting accurately, predicting future needs. And, it doesn't have to cost you a fortune to get into measurement; to prove its value to your operation.


Months
1 2 3 4 5 6 7 8 9 10 11 12
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$ 50,000
$ 0
Unused Capacity
Peak Requirements
Average Utilization
Item | Current Month Costs
Estimated Limits | $ 37,853.71
Peak Requirements | 67,595.91
Average Utilization | 110,613.94
Unused Capacity | 54,320.07
Total Costs | $270,383.63
Hardware Utilization Report
This is a Tesdata Utilization Report. Each month it charts total systems costs . . . and tells you specifically how much you are spending for "unused capacity" . . . how much goes for processing peak workloads, etc. It's a management report which gives you a quick visual picture of how efficient or inefficient your system is. Better yet, it gives you information which then allows you to "fine tune" your system to make it more efficient!

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Tesdata maintains service offices throughout the United States, in Canada, in Europe and in the Far East. We welcome your inquiry and an opportunity to tell you about our products and services; how we became the leader in computer performance measurement and how we are staying in the forefront. We would especially like to send you a booklet on computer measurement. It's called, "How to control your computer short of pulling the plug." It's free and easy to read. Simply call or write for your copy.

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SYSTEMS&PERIPHERALS

Bits & Pieces

Calcomp Enhances Fiche Unit With Software Features

ANAHEIM, Calif. – California Computer Products, Inc. (Calcomp) has enhanced its Microfiche Management System (MMS) with software features that provide greater flexibility in fiche indexing and titling and more efficient use of the 32K core in the system's off-line controller, according to the firm.

MMS, which produces microfiche at up to 300 page/min, provides users with a means of recording alphanumeric computer output on 105mm microfiche or 16mm roll film in a variety of user-selected formats.

With the software, an operator can now extract titling data from MMS by designating, via the system's keyboard, appropriate title characteristics and the search range within which that data may be located. The operator need not specify the title field's exact location.

Other titling enhancements include the ability to intermix fixed and variable titling data, to place from-to data in the title block and to specify either positive (normal) or negative (reverse) titling.

Indexing features added to the MMS include the ability to position page coordinates anywhere on a data page, to specify a fiche break field by indicating the field's characteristics within a certain search range and to easily change index entry fields, Calcomp said.

The MMS system costs about $3,000/mo from the firm at 2411 W. La Palma, 92801.

Kodak Interfaces Readers, CPU

ROCHESTER, N.Y. – By linking a standard teletypewriter-type terminal to a microfilm reader, an interface developed by Eastman Kodak Co. enables users to maintain a large microfilm file while using little active computer memory.

The interface essentially ties the computer to the reader to provide computer-assisted retrieval of information filed on microfilm, according to the vendor.

Numbers stored in the mainframe's memory reference more complete information contained on microfilm, Kodak said. The interface picks up a signal associated with the reference number as it appears on the terminal, permitting rapid retrieval and display of the referenced document on the microfilm reader, the company explained.

The interface will be available in the fourth quarter for less than $2,000 from Department DP-5019, Business Systems Markets Division, 343 State St., 14650.

Out With S/3, In With 360/30

Bigger System to Save Firm $65,000

By Patrick Ward
Of the CW Staff

CHICAGO – Replacing an IBM System/3 Model 15 with a 360/30 on third-party lease will save Everco Corp. $65,000 over the next five years, provide it with more capacity and give it more options in choosing software and peripherals, according to DP manager Gerald Fox.

The story began in February 1974, when a man from Datronic Rental Corp. telephoned Fox and offered to bring in a 360/30 on a five-year lease for $5,393/mo. Everco was paying $5,522/mo for its System/3 on a 30-day lease.

Fox's one-programmer shop had "no one that had ever seen a 30." Besides, "we had some doubts about signing up for such a long period," Fox said.

Everco makes auto replacement parts and "recession was on our minds," he explained. "You're just more flexible if your leases aren't that long."

But the System/3 "was getting into quite a bit of money for us," he said, and it seemed like the shop had to add more core and disk each year. Leasing was worth considering, Robert Friedman, Everco president said.

Because the 360/30 deal looked so good, Everco decided to contact several other third-party lessors to look for an even better bargain.

In the end, it finally settled on Datronic (also of Chicago), primarily because the firm "gave us the best guarantee that this thing would come off" and because Everco would not have to install the 360/30 unless it was satisfied with the conversion.

Everco had used its System/3 to run order entry, accounts payable and receivable, billing, credit memos, salesmen's commissions, several types of sales analyses, inventory and a couple of payrolls, Fox said.

The shop had developed a total of 350 RPG programs for its 64K mainframe, which had 50M characters of disk storage; an IBM 1401N2 600 line/min printer; a 200 card/min reader; and four 96-column punches from Decision Data Computer Corp.

The 360/30 system replacing it has 96K, of which 32K is add-on memory from Electronic Memories and Magnetics Corp. (EM&M).

Three Mohawk 1700 disk drives provide 90M characters of disk storage. A 1,000 card/min reader and 1,100 line/min 1401 N2 printer are also part of the system.

Datronic provided a lot of advice and technical assistance in the conversion, which started in January, Fox said. This included the use of a 360/40 at the leasing company and help in laying out the disk files for the 360/30, he said.

Datronic also provided software that took Everco's source code and flagged the items, mostly file descriptions and printer commands, that had to be changed, Fox said. There were usually only about four to six card/program that had to be reworked, he said.

The conversion process was completed by the weekend of Feb. 20. Everco didn't use a parallel run as it switched computers; it simply ran test data for each of its applications through the System/3 and then did the same for the 30.

The 360/30 came with the Asap spooler from Universal Software. Everco had not used a spooler on its System/3.

The spooler has made a big difference because it allows the 30 to do program testing or compilation in one partition while the other partition handles other jobs, Fox said.

The result was that the shop soon dropped its night operator shift, which will save $44,000 in salary over five years.

On the negative side, Fox finds the 30 "a little more difficult to operate than the System/3. You didn't have to specify the exact location on a disk drive where a file would go" on the System/3, he pointed out.

Everco would have soon had to add one or two more disk drives to the System/3, Fox said. While that processor would have needed a $500 controller for every two disk drives, he noted, the 30's controller can support eight drives.

And the Mohawk 1700s available for the 30 have twice the speed and one-third more capacity at a lower-price than the IBM drives on the System/3, Fox said.

Three Vendors Add Data Modules For IBM 3340 at Similar Prices

Memorex, 3M and BASF Systems have all come out with similarly priced Winchester-type data modules to operate inside IBM's 3340 disk storage facility.

The Memorex module, called Data Mark, is being offered in two 70M-byte configurations, the standard Data Mark 70 and the Data Mark 70F fixed-head version.

The Data Mark 70 was designed primarily to work with IBM System/3 and 370 computers. Its 13 read/write head elements provide moving-head access to approximately 70M bytes of data with an average access time of 25 msec, suitable for normal data storage activity applications, Memorex said.

Data Mark 70F, which utilizes a combination of 13 movable and 30 fixed-head elements, functions with Virtual Storage systems and high-activity disk files. The additional 30 elements, 10 heads with 3 elements each, are used to electronically page.

By using fixed heads for paging and movable heads for read/write functions, considerable computer time is saved, according to Memorex. The 70F provides fixed-head access to 502K bytes of the total 70 M-byte capacity.

The Scotch 948 data module from 3M is not only fully compatible with the IBM system, but additionally has 3M's Crashguard coating, its vendor said.

The company's initial production capacity includes two models; the 948/35 and 948/70, with capacities of 35M- and 70M bytes of data, respectively.

BASF System's Models 1335 and 1370 offer similar capacities.

Production delivery of the Memorex Data Mark 70 will begin in June, with the 70F version planned for delivery in the fourth quarter.

Purchase price of the Data Mark 70 is $2,000. It is also being offered under a purchase plan at $70/mo for 36 months.

In comparison, IBM's purchase price for the 3348 70M-byte data module is $2,200, Memorex said from San Tomas at Central Expressway, Santa Clara, Calif. 95052.

Both 3M modules are available now for purchase or lease. The 948/35 is priced at $1,500 and the 948/70 at $2,000.

The firm can be reached through Department DR5-3, Box 33600, St. Paul, Minn. 55101.

BASF's 1370 module costs $2,025 and its 1335 costs $1,475. Either module can be leased from the firm at Crosby Drive, Bedford, Mass. 01730.

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DS-7

Brochure Furnishes Methods for Prolonging Disk Life

By a CW Staff Writer

BURLINGTON, Mass. – A few common sense precautions in the handling, cleaning and storage of a disk pack or cartridge can help protect the data on disk surfaces, as some DPers have learned the hard way.

Users can get some advice on what to do and what not to do in a free eight-page brochure, "Disk Pack/Cartridge Management," available from Computer Link Corp. at 14 Cambridge St., 01803.

Disk management should begin while the packs and cartridges are still in their shipping container, according to the brochure. The user should check the box for damage and then look over the disks for dents, scratches and other harm.

Don't attempt to use a pack that looks like it has been damaged, the brochure advised.

Disk packs should be carried around by the handle, which is designed to support the pack at its center. "Always attach the bottom cover while holding the pack vertically by the handle," the brochure stated. "The locking knob cone may puncture the filter or bend the sector disk."

A disk pack should not rest on any surface unless its bottom cover is in place. Neither should disk packs be stacked, the brochure cautioned.

When loading a pack, operators should be sure they have turned the cover as far as it will easily go to guarantee proper seating of the pack on the drive.

No one should use a hand to try to stop a pack rotating on a drive. The spindown time is drive-controlled to minimize wear and prevent too much torque from being transmitted to the pack, the brochure explained.

The user should vacuum clean pack covers regularly, inside and out, to prevent dust buildup. File cabinets should be dusted for the same reason.

The user should clean packs with 91% isopropyl alcohol (9% distilled water), according to the brochure.

Preventive checking of packs and cartridges can prevent catastrophic failure, the brochure stressed. For example, the top cover's grip deserves checking to make sure the pack won't fall from its cover in transit.

The top cover also provides the means of turning the spindle lock to secure (or release) the pack on the drive. If this becomes worn or damaged, the user has the problem of getting the pack from the drive, the brochure said.

Beware Metal Flakes

The spindle lock is one of the more important parts of a disk pack. It has both a top and bottom set of ball bearings operated by an actuator shaft. If this shaft does not work, the user may have to disassemble a drive to remove the pack.

The spindle lock, also known as the winding screw, is threaded on the lower end to secure the pack to the drive. Should this threaded portion be cross-threaded in the drive (and it happens), small metal flakes can result.

These flakes can cause the actuator to become bound, the drive spindle to be severely damaged and, if not cleaned out, the flakes can reach the recording surfaces, causing head crashes, the Computer Link pamphlet warned.

The disk pack is built around its hub. The lower, cone-shaped part of this hub tends to accumulate a dirt and oil film, which can cause the pack to stick to the drive.

Computer-Link suggested all recording surfaces be thoroughly cleaned at least once a year and physically inspected not less than twice a year. Small marks or scratches often cause loss of data, data check conditions and costly reruns, the brochure said.

During inspection, these areas should be identified and decisions made. For example, the user might reinitialize and do a surface analysis; remove the pack from service and have it refurbished; or, if data checks occur, force reassignment of the questionable tracks.

If the user notices defects that protrude above the normal surface, Computer-Link advised removing the pack from service.

Finally, an air filter should be placed in disk drives to prevent contaminants from being carried with the air over the recording surfaces.

"No pack should ever be run on a drive without a filter," the brochure admonished. Since the read/write heads fly on the air supplied through the filter, a dirty or contaminated filter obstructing this air will cause the heads to strike the surface, damaging both the read/write heads and the recording surfaces, the brochure explained.

Two Systems Detect, Fight DP Center Fires

NEW YORK – Fire can be one of the biggest value worries for a DP manager since flame and smoke not only cause damage, but fighting them can add more.

Two firms are offering complementary products to help users detect and stop fires with minimal harm.

The ionization-type fire alarm system from ADT Security Systems here is said to alert DP centers to fires earlier than other alarm techniques.

The system senses combustion products in the air and does not require heat, flame or visible smoke to operate, the firm said. For example, it can detect smouldering wire before humans might notice it.

ADT's fire detectors can be mounted on a ceiling or installed in ventilating ductwork, large electrical cable conduits or beneath raised floors. Activation of a sensor can be set to produce an on-site alarm or to transmit a signal to fire headquarters or an ADT central station.

A system with six ionization sensors and associated control equipment costs about $870, plus installation, from the firm at 155 Avenue of the Americas, 10013.

For fighting fires, Graviner, Inc. now offers fire extinguishers filled with 16- or 22 pounds of Halon 1211.

Halon eliminates the corrosion of water and the contamination of powder and leaves no residue, the firm said. It is said to have three times the fire-quelling power of carbon dioxide and to weigh much less.

The extinguishers are listed by Underwriters' Laboratories for A, B and C category fires, Graviner said.

The 16-lb extinguisher costs $140 and the 22-lb unit $193 from the firm at 100 Industrial Road, Berkeley Heights, N.J. 07922.

Your search for the best financial control software just came to a halt.

You've just found it. The UCC Financial Control System. The best financial control software you'll find. There are over 103 reasons why:

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• A single financial data base • Full general ledger accounting • Budget preparation and review • Responsibility reporting • Cost allocation and profit center reporting • Product costing • Statistical accumulation and reporting • Automated systems interface • Flexible reporting • Easy to use report writer • Foreign currency accounting.

Second, fourth generation design with a single master file affords easier installation and maximum operational efficiency/reliability. It allows user control with a minimum of EDP intervention. Documentation is outstanding.

Third, it's backed by the long-term maintenance and reliable support of one of the largest and most advanced computer services companies in the world —UCC.

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Law Service Finds Independent Drives Cost 15% Less

DAYTON, Ohio – A computerized law library here of over 1.5 million legal documents, one of the nation's largest on-line data bases for any system of its kind, is stored on an array of 88 disk drives provided by an independent peripherals manufacturer at a 15% saving over the replaced equipment.

The legal retrieval system includes the full text of federal statutes and cases; New York, Ohio and Missouri (and soon Illinois) statutes and cases; federal tax materials; and federal securities materials.

The system allows lawyers and others to search through thousands of statutes and decisions in a fraction of the time it would take to do manually.

Lawyers, accountants and government agencies currently access the system through 150 terminals located remotely and connected by telephone lines into the computer of Mead Data Central (MDC), a service bureau which runs the system here.

The system works by scanning the statutes, regulations and decisions looking for key words and phrases designated by the researcher and then displaying the retrieved information in several forms – e.g., a listing of the statutes or cases containing the desired words or the text of the statutes or cases in full.

The service, called Lexis, presently contains 3.5 billion characters of information stored on-line in the Memorex 3670s, and 6 million more are being added weekly as new documents are added to the library. Since each 3670 drive has a capacity of 100 million characters, the entire 88 drives will eventually hold 8.8 billion characters of legal data and programs.

Memorex 3675 modules, 200-million-byte, double density drives, on order for delivery in the first quarter, will enhance Mead's storage capabilities.

"We had IBM 3330 disk storage drives, but the Memorex equipment is as good as the IBM and it's 15% less expensive. Also, with Memorex, we're getting better maintenance coverage," Richard L. Price, director of technical services for MDC, explained.

The 3670s are plug- and software-compatible with the two IBM 370/155s.

"We have disk packs which were created on IBM's 3330s which we're using on the 3670s with absolutely no problems," Price said.

The MDC full-text legal research system represents a new approach to legal research. Developed over the last five years by lawyers and technicians on the MDC staff, the system allows the researcher to input search words or phrases in any combinations using Boolean logic.

The user may also leaf through selected cases by page or turn directly to certain sections by typing special formats on the terminal keyboard.

Installation of COM Saves Bank Space, Costs, System Time

FORT WORTH, Texas – While it installed computer output microfilm (COM) four years ago to save space, the First National Bank of Fort Worth has since discovered the system cuts paper costs and computer utilization as well.

In addition to reducing storage space by a factor of 50 to 1, the bank's Memorex 1600 COM system has helped cut paper costs by over $1,000/mo, according to bank officials.

The system was installed well before paper costs went into an accelerated spiral. At that time, they noted, the institution found itself suffocating under a huge amount of hard-copy printouts of daily financial transactions.

Now, in addition to storage, paper and utilization savings, COM used on-line can print at 10,000 line/min in comparison with the 900 line/min rate of the IBM 1403 printer the system replaced, officials said. At this speed, the mainframe can generate the bank's daily transactions, amounting to 2 million lines, on schedule.

Better CPU Utilization

COM has also allowed the CPU and its on-line peripherals to be better utilized since they are not slowed by a hard-copy printer, according to Harvey Urban, DP manager for the bank.

A higher throughput is achieved as a result, he said, although the bank has not measured the actual difference between previous and present performance in this area.

The bank still maintains two IBM 3211 printers and one 1403 to produce output for some 20 affiliate banks it services. "At present, there is no demand for COM by user banks," Urban stated, suggesting that the expense of cassette viewers and a preference for hard copy probably account for the lack of interest in COM.

But First National uses COM alone for all of its reports and other output, he said. "Eventually, we would like to see all impact printing eliminated from our operation," he added.

Switches COM Between Mainframes

The bank uses both its IBM 370/145 and 360/40 with a single COM system by switching it between the two mainframes, officials commented.

The institution's daily output includes installment loan data, late charges, bond sales, demand deposit balances and reports on the bank's overall financial status.

Each department duplicates in cassette form that part of the film output it needs. Cassette viewers placed at 15 locations around the bank are used for referencing the film cassettes.

The original film becomes the archival record, stored in eight-ounce cassettes. Each cassette holds the equivalent of 2,400 pages of 11 in. by 14 in. sheets.

Officials indicated the COM system and its 23 viewers rent for about the same price as the replaced impact printer.

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The National Computer Conference will be filled with better ideas than ever this year, and *Computerworld* will be there with up-to-the-minute coverage in three special issues. The news begins before the show in our *NCC Preview Issue*, where we'll be telling you all about the products, exhibits and ideas you'll see. Next, our Editorial writers will report the latest details and developments of how it all happens in our *NCC Show Issue*.
And our *Post-Show Wrap-Up* caps it all with in-depth reporting and analysis of the important events and stories of NCC. In all, you'll get three weeks of current information you'll use--so be sure you make *Computerworld* a part of your NCC plans.
If you're an advertiser in the EDP industry you should note that extra copies of *Computerworld* will be distributed right at the show, so you'll get more readership than ever. But don't miss the closing date--issues and ad closings are listed below.
To get all the details, just contact your *Computerworld* salesman.
Or call Judy Milford or Sara Steets at (617) 965-5800.

	Issue Date	Color Closing	Black & White Closing
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NCC Show Issue	**May 21**	**May 2**	**May 9**
NCC Post-Show Wrap-Up Issue	**May 28**	**May 9**	**May 16**

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Data Communications

Course #1010–

Practical Data Communications Systems and Concepts

This course will give you the information you need to master the newest developments in Data Communications. Led by the nationally recognized teleprocessing consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC. HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of satellite carriers. This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule is as follows:

Chicago—Jun. 2-3
Orlando—Jul. 2-3 **Washington, D. C.**—Jun. 9-10

Course #1020–

Advanced Teleprocessing Systems Analysis and Design

This course is a follow-up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost-optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for a reduced rate of $400. Current schedule is as follows:

Los Angeles—Jun. 16-18

Last day for enrollment is May 16th.

Data Base Design

A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed to construct data base systems. In fact, the former is of questionable value without the latter.

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- *Effective Record Design*
- *Physical Storage Techniques*
- *Optimum File Organization and Indexing Techniques*
- *File Integration*
- *and much more*

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques, just learned, to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs $350., including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

Chicago	Sheraton O'Hare Motel	May 12-14
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A seminar that gives you the legal tools you need for effective negotiations, agreement drafting, warranties, security, tax planning and software protection.

The impact of the law is felt in virtually every aspect of the computer industry, and you need to know how to apply the legal rules in a positive way to increase you advantage in dealing with vendors that supply your installation. This course teaches you how to avoid the legal pitfalls that can be costly and embarrassing to you.

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You should attend this seminar if you are involved in contracting for the use of computers or computer services–whether as a Corporate Executive, DP Manager, Contract Administrator, Consultant, Inside Counsel, or as a Private Practitioner involved with clients who use computers. Cost for the entire 2½ day seminar, including continental breakfasts, luncheons, and complete resource materials is $325. Additional registrants from the same company are charged only $275. Current Schedule:

New York St. Moritz June 4-6

Performance Evaluation and Improvement

A seminar actually designed to save your installation money.

This course starts with a discussion of questions and specific problems attendees have about system performance at their own installation. Then step by step each attendee will learn the methodology necessary to understand the problems and implement the answers. The techniques presented at this seminar are in effect at numerous installations today, and have extended the life of one S/360 for more than two years—a savings, at last estimate, of more than $700,000 for one user.

Our course leader is Saul Stimler. His book, *Data Processing Systems: their performance, evaluation, measurement, and improvement,* will be an important part of the seminar. As well as case studies, topics that will be covered include:

- *Criteria for quantifying performance* • *Pencil and paper analysis of a system*
- *Benchmarking techniques* • *Realtime, batch, and interactive time sharing systems*

You should attend this seminar if you are a data processing professional or corporate executive whose responsibility it is to plan, benchmark, evaluate, or improve data processing systems.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials (including a copy of Saul Stimler's book on the subject) is only $250.

Current schedule:

New York **Waldorf-Astoria** **May 5-6**

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Key-to-Storage Systems

How to evaluate and optimize the various successors to keypunch equipment.

Data entry is a big problem—and a big headache—as every computer user knows. It is therefore a prime target for cost savings. This course is designed to help you in the practical aspects of selecting, installing, and making the best use of keyboard-to-storage systems. It is an expansion and an update of our successful key-disk seminar. Under discussion (including some user case studies) will be:

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- Key-disk hardware and software
- Evaluating . . . and starting . . . key-disk systems
- Selecting and operating intelligent terminals, both key-to-cassette and key-to-floppy disk
- Key-disk as a remote batch terminal
- Supervisor functions; motivation
- Mixed Media systems
- Trends in Computer Data Entry

This seminar is lead by Lawrence Feidelman, President of Management Information Corporation, and one of America's leading experts on data entry. All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry, including a six-month update of this continuing reference service.

You should attend this seminar if you are concerned with optimization of your data entry shop, and especially if you are considering or currently using key-to-storage systems more advanced than basic keypunch. Cost for the 3-day seminar is $350, including continental breakfasts, luncheons, and all course materials. Additional registrants from the same company are charged only $300.

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Brings Leap 'From 1928 to 1978'

System Updates Police Clerical Methods

By Patrick Ward
Of the CW Staff

NEWTON, Mass. – By putting its recordkeeping work on a minicomputer, the Newton Police Department found it could reassign nine officers formerly doing clerical work and gain $144,000 worth of increased patrol coverage.

The system's quick data retrieval and detailed management reports helps the police "know exactly what's happening in the city of 91,000 where we didn't before," Timothy C. Coogan said.

And a mini system like Newton's can pay for itself in six months through quick action on delinquent parking tickets alone, he added.

Coogan is legal and research advisor to Police Chief William F. Quinn, who started the department's computer project in 1970 with Law Enforcement Assistance Administration (LEAA) funds.

One reason the Newton Police Department turned to a minicomputer, Coogan said, was that a shared system which the police themselves did not control would be illegal under Massachusetts law.

Hired Outside Consultant

The department's first step was to hire the Mitre Corp. of Bedford, Mass. as a consultant. Mitre received $22,899 to do a systems analysis of the department's manual recordkeeping procedures and time-consuming federal, state and local reports it had to produce.

The Newton police then paid Mitre $27,000 more to prepare applications-oriented specifications for bidding. It sent these to 72 vendors and received nine responses, half from turnkey systems firms and the rest from minicomputer vendors.

For $6,944, Mitre analyzed the proposals, which ranged from an unacceptably Spartan low bid of $69,594 to a high of $117,023.

Basic/Four Corp. won with the lowest acceptable bid of $47,325 for hardware and $24,475 for software to be developed by its subcontractor, Engineering Computer Systems of Lexington, Mass.

Other than the price edge, Coogan said he thought Basic/Four had the best operating system for business-oriented users. Two other points in Basic/Four's favor were that it was the sole hardware supplier, and that Sorbus, Inc. would maintain the system, he said.

The Newton Police Department first installed a 24K Basic/Four Model 350 processor with two matrix printers, a 4.2-M-byte disk drive and a 7-track magnetic tape unit.

The system has since grown to a 32K Model 400 processor and the department has added another matrix printer, disk drive and CRT.

Software development for the Extended Basic language system took about four months, Coogan said. When it was completed, the police department's clerical operation went "from 1928 to 1978, from pad and pencil to solid state," Coogan remarked.

Biggest Impact

The minicomputer's biggest impact is avoiding duplication in paperwork, he explained.

Operators key in data only once after officers telephone in reports on such things as arrests and traffic accidents to a clerk who checks codes on a preprinted card and takes down the officer's narrative.

This card goes to an input clerk, who keys the data through a CRT. If the officer's report includes a burglary, for example, the system automatically brings up a screen for inputting detailed information on the location, type of building, method of entry and so on.

The system edits this data as the operator enters it, and supplies reference material to fill out the report, Coogan noted.

The CPU then "gives this information back in 10 different ways," he remarked.

Based on this data, the system prints out the "police blotter," a continuous 24-hour report that ends by totaling up the day's events by classification.

The system also prints out 5-in. by 8-in. complaint dispatch forms for all significant incidents and 3-in. by 5-in. name reference cards that refer the user to the appropriate complaint/dispatch form.

The cards are faster and more accurate to work with than putting these inquiries on-line, Coogan observed. This is especially true in tracking down a name, he said.

If an officer telephones in a report that includes an arrest, that screen is also brought up immediately afterwards. This automates the department's booking procedures and eventually appears in FBI reports.

Tracks Down Parking Violators

Officers' reports also include lists of parking tickets they've written and the license numbers involved. After 21 days, the system produces a tape of unpaid tickets for the state's department of motor vehicles.

The state rewrites the tape to include addresses, and then the Newton police system prints summonses.

Manual methods previously left the department with mountains of paperwork to track down late payers. Often people had moved by the time their summons had arrived, Coogan recalled.

The minicomputer can save a city like Newton $100,000- to $200,000/year, alone, he said.

The system also generates reports on the location of accidents, the percentage occurring during the day or night and other details.

It can produce similar reports on burglaries and larcenies.

Every traffic violation written by the Newton police is also entered.

CW Photo by P. Ward

Timothy C. Coogan works at one of the Newton Police Department's CRTs as Chief William F. Quinn looks on.

The chief can then see the number of violations issued by individual officers, platoons and bureaus. The department uses these reports to redesign "beats."

And "once police officers knew there was management evaluation of their work output, it jumped," he said. While this may appear to be bad news for drivers, it has cut down the number of accidents in Newton, according to Coogan.

But one of the biggest labor-saving breakthroughs came in preparing monthly reports for the state and annual reports for the FBI.

The annual FBI report formerly required one person working full-time for two weeks, Coogan said. The minicomputer prints it in 30 minutes.

Coogan believes Newton is one of the first city police departments in the nation to use a minicomputer. Now that the software has already been developed, the police department is ready to offer it free to other law enforcement agencies, he said.

Dispatch System On the Way

NEWTON, Mass. – A minicomputer may soon be speeding the response of the Newton Police Department to calls on any of the 500 bank, store or private home alarm systems that tie into police headquarters.

The system is also intended to protect police officers by getting as much information as possible to them while they drive to the scene, according to Timothy C. Coogan, legal and research advisor to Police Chief William F. Quinn.

The city has completed development work on the computer-aided dispatch system to run on its Basic/Four mini.

When an alarm signal comes in, the address will be displayed on a control board and automatically fed into the minicomputer system.

With the previous system, the dispatcher would not necessarily know anything about the building the alarm was coming from or what officers were patrolling in that area.

The computer-aided dispatch system, however, will display the name and location of the alarm site on a CRT, what kind of alarm has been sounded and what officers are likely to be nearby.

The display will show "all the police should know about the site," including warnings on side doors, attack dogs, private guards on duty and even if it is a site that might attract drug addicts.

Wangco Disks Linked to Novas

LOS ANGELES – Wangco, Inc. has interfaced its moving-head disk (MHD) line to Data General Corp. Nova minicomputers, the firm said.

It has also provided Nova interfaces for a magnetic tape adapter, it said.

The Series F Series T disk drives use IBM 2315- and 5440-type cartridges, recording 2,200 bit/in. on 100- or 200 track/in.

The Series N features the same recording capability on one or two fixed disks. Its capacity and access time compare with those of the IBM System/32 fixed disk drive, according to Wangco.

The controller is contained on a single printed circuit board which requires one slot in the Nova computer. As many as four Wangco Series F, T or N drives can be daisy chained utilizing a single controller to provide a maximum storage capacity of 40M bytes.

The MHD disk controller is compatible with Data General's RDOS operating system. The same controller can be used with all Wangco disk drive models.

Magnetic Tape Adapter

The Wangcotape Magnetic Tape Adapter (MTA) is a printed circuit board which also utilizes a single card slot in the Nova computer. The MTA is connected to an external Wangco magnetic tape formatter via a separate cable which is connected to the backplane of the computer.

The formatter configuration may be a single NRZI formatter that handles 7- or 9-track NRZI tape units or a single phase-encoded formatter for 1,600 bit/in. phase-encoded 9-track tape drives. There is a dual-density version of the formatter.

The disk systems cost from $6,000 to $8,000 depending on capacity, and the tape adapter costs from $6,000 to $12,000 from the firm at 5404 Jandy Place, 90066.

Memorex Modifies Terminals to Work With Minis

SANTA CLARA, Calif. – Memorex Corp. has modified three of its communications terminals to be hardware- and software-compatible with Hewlett-Packard, Data General, Interdata, most Digital Equipment Corp. and any other minicomputer with an RS-232 interface.

The company is offering mini users the terminals at one-third their original prices.

The models 1240, 1242 and 1280 keyboard/printing terminals operate at speeds up to 120 char./sec, 12 times the speed of conventional teletypewriters traditionally used as minicomputer consoles, the company said.

'Proven Gear'

Besides the lowered prices, easy hookup, no hardware or software modification and improved speed (which allows users a significant increase in CPU throughput), the terminals are "proven in terms of their widespread use during the past four years with IBM 360s and 370s," Memorex said.

The 1280 terminal features an integral magnetic tape cassette with a capacity of 180K characters. The cassette storage eliminates the problems of slow speed, handling and storage usually associated with paper tape, Memorex noted.

The 1280 tape cassette operates in an eight-bit code compatible with a mini's object code. A user select switch allows the use of an eight-bit binary code or the standard seven-bit Ascii code.

The 1242 includes a line buffer (up to 512 characters) which enhances efficiency by allowing the operator to prepare and edit a block or line of data before it is entered, Memorex said.

In their modified forms, the terminals are offered at $2,975 for the 1240, $3,800 for the 1242 and $4,500 for the 1280 from the firm at San Tomas at Central Expressway, 95052.

The modified Memorex terminals offer communications to users of minis with RS-232 interfaces.

Wholesaler's Mini Almost Pays for Itself by One Job

STRATFORD, Conn. – Park City Food Products, Inc., a food wholesale firm, cut expenses, made maximum use of its resources and tripled dollar volume last year from $2 million to $6 million and set a goal of $10 million for 1975.

Among the resources Park City uses to the fullest in its money-saving efforts is a Digital Equipment Corp. Datasystem 340 based on a PDP-8/E minicomputer. The system, including service and programming, costs about $1,500/mo and, according to Ed Greene, president of Park City, almost pays for itself by one function alone – documenting rebates from suppliers on products eligible for discounts.

Change Is Constant

Park City deals with 500 vendors and has a stock of 2,000 products to offer its customers. With new products replacing old and frequent price adjustments, the business is one of continual small changes – as many as 100 a week.

All price changes are handled quickly by Greene from a desktop CRT terminal. The foreground/background processing capability makes it possible for Greene to enter price changes on his terminal while another operator is printing invoices, purchase orders or a new price list for a salesman on the line printer.

The minicomputer includes 32K, two Decpack disk drives, two VT05 video terminals and a line printer. Its operating system is DEC's COS-300. Application programming uses Dibol.

The computer's two disk packs make 6.4M characters of information available at any one time. This includes complete customer files, names, addresses and significant information; inventory files which are automatically adjusted as orders are filled and stock replenished; a list of all purchases by vendor and by product, including the last ordered quantity and price; a file of goods ordered but not received; a file of orders by salesman and records of all transactions.

Using this data, Park City produces invoices, warehouse picking lists, shipping documents, customer order/price lists, monthly statements, a list of aging accounts, reports on cash received and sales reports by customer and by salesman.

The data is reshuffled into reports on purchase orders, inventory status and a "buy guide." Joe Greene, vice-president of Park City, has designed a new program called "knuckle rapping," which keeps a tally of lost profit as out-of-stock product numbers are entered.

The Datasystem 340 makes it possible for Park City to customize order forms by client. The computer prints out a multipart form with a cover sheet containing products by name brand, size, price per carton, price per unit and the portion and number of servings per carton and per unit. Any item not ordered by a customer during three quarters is dropped from his printed price/order sheet.

The computer has not only simplified the price changing operation, it has reduced the order entry procedure from four hours to 15 minutes. This is how it goes.

At the end of the day, all orders are assembled by delivery route, and a copy of each order goes to the computer room. Here, the CRT terminal operator keys in the customer's number for each order, a credit check is performed and, if the customer has approved status, the order is entered by typing in the product numbers and quantities from the order forms.

If an item is not in stock, the customer's second choice is automatically substituted, unless otherwise indicated; then, the operator orders the machine to pass over this function.

When all items are entered, the order is noted for invoicing and taxes are computed according to the state in which the institution is located. The line printer prints out a picking list and shipping document. A copy of the invoice is retained in the computer files and the inventory status is updated.

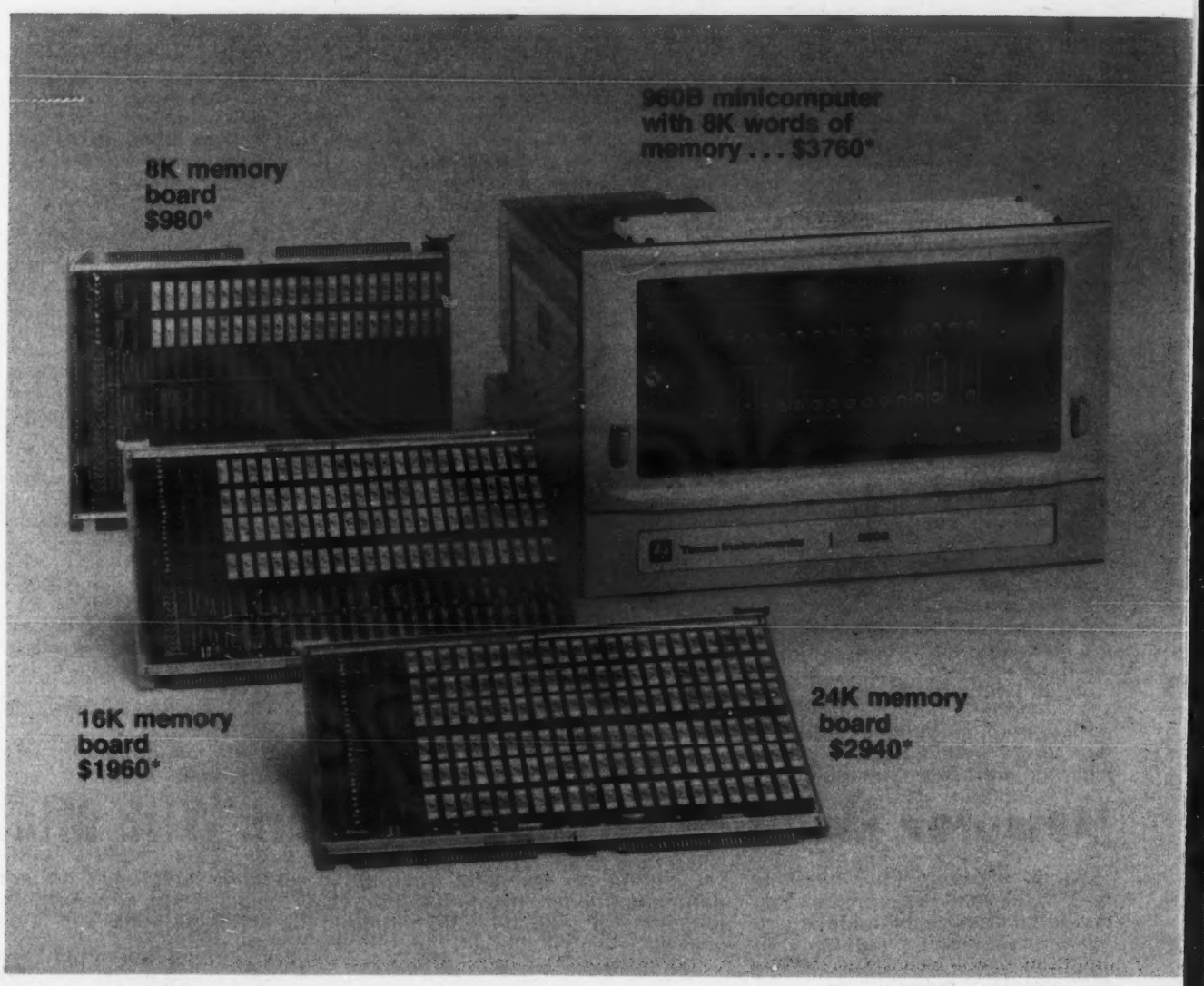
DEC Unbundles Series Of PDP-8/A Processors

MAYNARD, Mass. – Digital Equipment Corp. has both the PDP-8/A-100 and PDP-8/A-400 processors available on a board-by-board, building-block basis. This hardware unbundling of the PDP-8/A permits customers to acquire those elements of a PDP-8/A minicomputer that are cost-effective to his particular application.

A typical semiconductor memory PDP-8/A configuration consists of the central processor module, a 1K-word semiconductor random-access memory, a 2K-word read-only memory and a 6-slot Omnibus. The price of this configuration is $1,830.

A typical core memory PDP-8/A configuration would consist of the central processor module, 8K-words of core memory, memory extension, a time-share control, a bootstrap loader, a power-fail auto-restart feature and a 6-slot Omnibus. The price of this configuration is $2,475.

New low prices and Texas Instruments 900



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Improving man's effectiveness through electronics

System Reduces Man-Hours

Law Firm Finds V73 Key to Keeping Billing Current

SANTA ROSA, Calif. – A San Francisco law firm recently reduced its professional billing and related accounting and report operations from 25 man-hours daily to nine man-hours, and its billings are current instead of six weeks behind schedule.

The reason is the use of a Varian Data Machines minicomputer with application programs provided by Prodata International Corp.

Previously, the San Francisco attorneys used two Monrobot accounting machines to control accounting for 12 attorneys and 50 paraprofessionals. The records were stored externally on magnetic cards which operators had to manually insert in the hopper of the computer when inputting data.

The growing complexities in legal billing are suited to computers which can retrieve and manipulate internally stored data under various billing parameters: hourly basis, project basis, retainer disbursements, a combination of both, etc.

Typically, the system starts by attorneys logging their daily time and activities. This daily log process, however, is greatly simplified. Codes in the V73 program allow user-tailored, abbreviated entries.

The attorney's daily log in addition to these descriptive work codes includes client and matter identification (e.g., lease negotiations), number of hours and tenths worked on a matter plus the date and individual attorney code.

The computer automatically extends hours times dollar amounts on file in the client's record or computer data base. If, however, an attorney wishes to override a previous hourly-rate instruction on file, he can enter the new dollar amount in the daily log.

A work status report or client ledger, a monthly listing of all transactions from the daily log arranged by client and by matter, allows individual attorneys to review all transactions sequentially for the previous month plus related hours and billing amounts. This procedure allows lead (billing) attorneys to issue special instructions prior to actual billing.

For example, an order to confine a client's billing within a previously agreed monthly retainer will result in the computer reducing all charges recorded by the firm's other attorneys on behalf of a specific client in ratio and proportion to the total reduction required to match the retainer.

The resulting computer-printed monthly statement can be prepared in two versions. An external statement for issuance to the attorney's client can, for example, identify all individual costs by name and amount, list all professional services but show a total-only amount for all the professional services rendered during the month.

An internal copy of the statement, in addition, may show the number of hours and the related fee for each service performed, as adjusted by the lead attorney.

Four Input Areas

In total, four areas of inputs are required to effect an integrated legal billing system: the daily log, the attorney's billing instructions, previously stored client and matter information (on disk or tapes) and collection transactions.

In addition to statements various operating and management reports are generated.

Collection reports, aged accounts receivable, billable versus nonbillable hours and summaries by the individual attorneys (year-to-date billings vs. last year-to-date, for example) are a few of the extra reports available as a byproduct of billing operations.

An additional document assembly system performs text editing and print format tasks. As a result, standard paragraphs, together with specially required language, may be combined in the preparation of wills, contracts, deeds of trust and other documents, eliminating manual entry of standard language.

Compusystems Named U.S. Agent for MCM

NANUET, N.Y. – Compusystems, Inc. has been named U.S. distributor for the microcomputer products of Micro Computer Machines, Inc. (MCM) of Ontario, Canada.

Compusystems was formed at the beginning of this year to specialize in the marketing of stand-alone microcomputers and microcomputer-based systems, peripherals and applications packages.

The firm can be reached through P.O. Box 333, 10954.

proven reliability for series computer memories

Now, semiconductor memories with built-in error-correction circuitry and 100,000 hours MTBF... for as low as $980 for 8K 16-bit words.

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New low prices

As has always been the case at TI, improved performance and reliability have continued to come down in price. The trend continues . . . with new reductions in memory prices up to 38%.

Each 8K increment of memory for TI's minicomputers is now only $1400 in CPU quantity one. With attractive end-user and OEM discount schedules, this price drops to as low as $980 for OEM CPU quantity 100.

	TI 960B	TI 980B	HP 21-M/10	DEC PDP-11/05	DG Nova 1210
	S/C memory w/error corr.	*S/C memory w/error corr.*	*S/C memory w/parity*	*Core memory w/o parity*	*Core memory w/o parity*
CPU w/8K words	$4,700	$5,075	$6,150	$ 5,995	$5,800
CPU w/16K words	6,100	6,475	7,650	7,495	7,400
CPU w/24K words	7,500	7,875	9,150	12,195	9,400
Price includes:					
ROM loader	Yes	Yes	Yes	No	No
Power fail protect	Yes	Yes	No	Yes	Yes
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All prices quantity one, USA only.

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TI's computer memories are designed using reliable 4K RAM devices. Multi-bit error detection and single-bit error correction are standard features of these memories. With these features, if a single-bit failure should occur, the memory controller corrects the error and transfers valid data to the CPU so that valuable processing can continue. Also, light emitting diodes indicate the exact location of a faulty memory device.

Innovative features such as these provide significant reliability benefits for users. MTBF, for instance, is 100,000 hours for an 8K word board . . . which means increased uptime.

Density . . . an attractive feature

Increased density is another very important benefit. Because of TI's 4K RAM, users can have 8K, 16K, or 24K 16-bit words of memory on a single board, and can get as much as 65K words of memory in the main CPU. Significant? Indeed it is . . .because this increased density, along with built-in reliability, comes at very low prices.

What's more, TI backs these products with a network of sales and service offices across the U.S. and in major countries overseas.

For the full story, contact the nearest sales office listed below. Or, write Texas Instruments Incorporated, Digital Systems Division, P.O. Box 1444, M/S 784, Houston, Texas 77001. Or call (512) 258-5121, Computer Systems Marketing.

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TEXAS INSTRUMENTS
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DEC Minis Match Movies With Customer Requirements

NEW HYDE PARK, N.Y. – What does a film-lending company do when a civic club asks for a series of films on business and finance, each about 45 minutes long, for showing over the next several months?

Refer the matter to a minicomputer, according to William M. Oard. He is executive vice-president of Modern Talking Picture Service (MTPS), which handles 1.5M film transaction/year to individuals and religious, civic and social organizations.

"With 2,100 film titles, no person can keep in mind the current availability and subject matter of all of our stock," Oard explained.

Instead, MTPS' booking clerks use interactive terminals to work with a variety of programs on the firm's Digital Equipment Corp. PDP 11/20 and 11/45 minicomputers.

When customers want MTPS to select a movie program for them, they let the firm know what the audience makeup will be, what type of film they want, when they want to schedule them, and how long they want the films to run, Oard explained.

More Productive, Efficient

"Because the computer can keep track of all available films in the library, including their availability by date, it can match these elements up to the customer's requirements. Rather than the cumbersome hand sorting of records, this is all done quickly and easily. And it's less prone to mistakes, which results in more satisfied customers. And, to be sure, it makes our activities more productive and more efficient."

If the customer requests a particular film from the MTPS catalogue, the computer checks through all of its data files relating to that particular film title to determine whether any prints would be available in that time period.

If not, the computer communicates that the film is unavailable and can search its files to see when a copy of the film will first be available (which could be specified by the operator to be nearest day or nearest same day of the week). It could simultaneously record the information that a film was out of stock to determine the popularity of the title. And it could print out a card explaining the nonavailability of the film for a particular date and list the alternate dates the film would be available; this card would be sent to the person making the request.

Oard started with the 11/20 and did most of the programming himself. It was "quite complicated," he recalled.

As MTPS switched more and more of its workload onto the 28K 11/20, it outgrew that machine and added the 64K 11/45, which is "much faster," Oard said.

Both systems run under DEC's RSTS operating system and use DEC disks and seven-track tape drives. The 11/45 drives 16 local DEC VTOS CRTs for interactive work plus an IBM 2741 which outputs camera-ready copy for the firm's catalogue.

MTPS hangs tapes from either mini onto a Honeywell 200 that handles billing, Oard said.

A Scheduling System Application

MTPS decided to bring in the minis three years ago because the application is "basically a scheduling system and it looked like we could do the job better and cheaper" with a minicomputer, Oard said.

He first listed the operations normally required of a distributor and then determined how the computer could fit in. Among these tasks are:

- Film Title Records – Perhaps one of the most important pieces of information for any library is a list of available titles. These can be found in printed catalogs, but a library is constantly getting new films and withdrawing old films. Catalogs are printed periodically and may not be up-to-date, yet the information must be.
- Print inventory – Related to the records of film titles is the inventory of the number of prints of each title on hand at the library. If there is a heavy and sustained demand for a particular title, there may be a requirement for additional prints of that title. Also, some prints are withdrawn because of their physical condition such as scratches, poor and uncorrectable splices or torn sprocket holes. These withdrawals, too, could affect the library's ability to respond to borrower demands.
- Catalog descriptions – In addition to knowing the title of each film in the library, it is important to have ready access to a description of each film's content (a film titled, say *Five Minutes*, could concern medicine, safety, cooking, religion, farming, sports or crime prevention). And through the content description, it is possible to categorize each film into its appropriate grouping.
- Film availability – This is a complex parameter, since there are different considerations that determine whether a film is available. First, there is the matter of territorial restrictions. All films available from Modern are listed in the catalog, but some of these are restricted to distribution to specific territories by their sponsors, Oard said.

Another consideration is that of prior commitments. A very popular film may be booked solid for a period that includes a requested playdate. Related to this is to determine whether there are alternate films on the same or similar subjects that may be available to the requestor.

The complexity of this problem can be brought into sharper perspective by noting that Modern has 30 film libraries throughout the U.S. and Canada. This averages out to 50,000 transaction/library a year, including all of the details just discussed. With the increasing demand for such films, the amount of data required is bound to increase geometrically.

The minicomputer system has made the MTPS operation "into a completely different ballgame," Oard stated.

There are "far fewer errors," yet the company staff has shrunk from 350 to 295 people amid a rising volume of business, he said.

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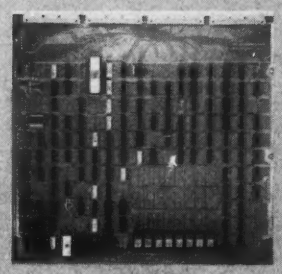

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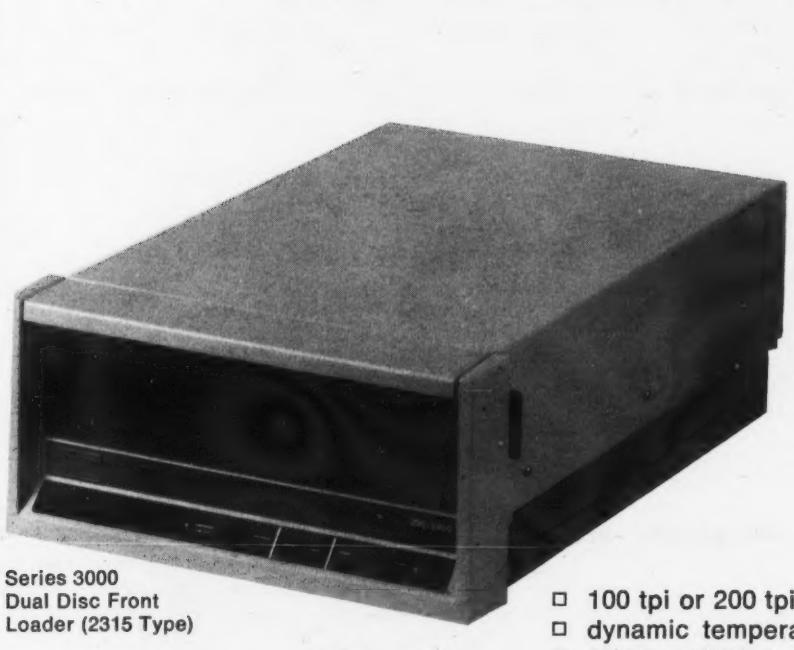

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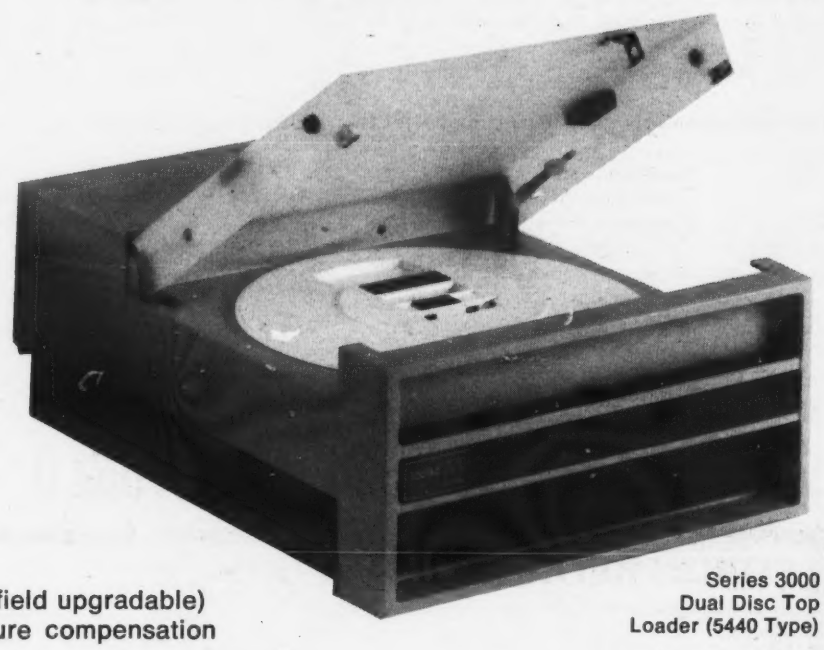

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CI Notes

Potter Files Under Chapter 11

PLAINVIEW, N.Y. – Potter Instrument Co. has filed a petition for court protection under Chapter 11 of the Federal Bankruptcy Act.

When last heard from, Potter had announced it was suspending operations because of inability to refinance its debt [CW, April 16]. Company officials have been unavailable for comment since then.

The action purportedly does not affect any of Potter's domestic or foreign subsidiaries, which are expected to continue operation.

The petition is intended to allow Potter's present management to continue to look for funds while being protected from action by its creditors.

Potter listed its liabilities as of Jan. 31 at $25.6 million and its assets at $11 million. The current portion of long-term debt was put at almost $18.1 million.

Total assets, including investments in subsidiaries and "intercompany receivables," were $45.8 million and total liabilities $33.2 million.

IBM Takes Option on Neotec

ARMONK, N.Y. – IBM, which made its last acquisition in 1964, has purchased an option to buy "a substantial portion" of the assets of Neotec Corp., a maker of analytical instruments, for $5 million.

IBM said analytical instruments "may fit into our general business interests."

The option, which expires June 16 and cost IBM $50,000, covers an agreement to buy patents and other rights, inventories and receivables to products that measure the characteristics of grain, produce and other matter.

The Neotec products involved measure characteristics of materials by analyzing light that has been passed through or reflected from an object.

The agreement does not cover Neotec's ground meat analyzer or products of its subsidiary, Neotec Electronics.

Neotec said if IBM exercises the option, completion of the transaction is subject to several conditions including approval by its shareholders.

MDS to Close Two Plants

HERKIMER, N.Y. – Mohawk Data Sciences Corp. (MDS) plans to close its Bohemia, N.Y., and King of Prussia, Pa., manufacturing facilities and relocate operations at its plant here. A total of about 260 employees are affected.

The move is part of a belt-tightening program that has been occurring within the firm, which now has three U.S. locations: Anaheim, Calif., Brooklyn, N.Y., and Herkimer.

The Bohemia plant manufactures the Bucode line of tape drives while operations at King of Prussia involve tape drives, cartridge recorders and printers.

American Used Buys Printers

BOSTON – American Used Computer Corp. has bought the lease base and offrent inventory of Dataproducts Corp.'s Off-Line Print Systems from Transamerica Computer Co.

The inventory consists of 127 Dataproducts 4000 units, which had an original purchase price in excess of $11 million.

ITT Selects GE Terminet

WAYNESBORO, Va. – General Electric's Data Communications Products Department will supply ITT Creed, a subsidiary of International Telephone and Telegraph, with its Terminet 30 matrix printer for sale and distribution in Europe.

The units will be known as the ITT 3330 data printer.

Media Makers Note

Magnetic Memory Product Prices Sliding

By Nancy French
Of the CW Staff

The higher end-user prices for magnetic memory products predicted by media makers six months ago have never materialized, and media prices are now as low as – if not lower than – they were a year ago, a *Computerworld* survey has found.

Media makers had said higher prices would be needed to cover the skyrocketing cost of raw materials, and an announcement by Memorex Corp. that it would review prices quarterly was seen by some as an invitation for all media makers to follow suit.

The cost of polyesters, adhesives and lubricants used to manufacture magnetic memory products had increased 30% and packaging materials had increased 12%, they said.

But Memorex never actually instituted that pricing policy because it wasn't necessary after all, according to Gary Fisher, its national sales manager.

"We have made no price increase announcements to date and only plan to do so if price changes are significant," he said.

"Many manufacturers overbought in anticipation of shortages that didn't really occur and aren't buying now, which is forcing their basic raw materials suppliers to make better deals," Tony Capolla, vice-president of marketing at Electronic Memories and Magnetics (EM&M), added.

A prime example of low end-user prices is the Federal Supply Contract, according to Art Field, national sales manager, Graham Magnetics.

Last September, Field said, the 3M Co. won a contract with a $9/reel quote. "The price is going to be even lower this time," according to Field, who said Graham bid as low as it could and its bid was still "$2 more than the lowest bidder."

Mike Emmerich, president of Computer Resources, Inc., a Cleveland-based media products manufacturer, concurred.

"A year ago users were buying 2,400-ft reels of 1,600 bit/in. for about $12/reel in small quantities and for as little as $8.75 in orders of 200 reels or more from suppliers other than IBM," Emmerich said.

"Small orders are now averaging $10.75 to $11 a reel," he said.

EM&M's Capolla attributed these low prices to "product dumping" by companies that are having cash flow problems.

"These companies are having a hard time getting the cash they normally generate by maintaining a large lease base. Inventory of all types is building up," he said, "so they are dumping products.

"This is very spotty and a short-term action, I think," he added.

In disk memories, prices are dropping even faster, despite stabilized but still high manufacturing costs.

"IBM 5440-compatible top-loading cartridges, which in January of 1974 were pulling $110 to $120, are now going to end users at $79 to $85," Emmerich noted.

And the 3336-compatibles which sold for a unit price of $525 a year ago, compared with $775 from IBM, are now averaging only $400 each, he said.

'Satisfied With Business'

As for current sales volume, most marketing managers said they were satisfied with business in light of present economic problems.

Curt Koefod, marketing director of data recording products for 3M Co., said "this isn't exactly a boom time, and sales are what we expected they would be under the circumstances.

"We recently introduced several new products and will be introducing more during the year that should help contribute to total sales by year's end," he said.

Graham's Field said "the demand for tape is better this year and, although business is generally slow, sales are slightly up.

"The economy is soft and more customers are squeezing pennies and dollars," he said, "but our tape business will increase. We sell quality – and the quality market is still there."

Paul Weber, marketing manager for Ampex Corp.'s Media Division, admitted that lower prices called for strategy. "Companies like BASF, 3M and Ampex make products other than computer tape, so when prices get so low they can't make their overhead they simply deemphasize that part of the business" in favor of another product line, he said.

Semis Seen $1.1 Billion Victor In '83 Memory Components Race

By a CW Staff-Writer

NEW YORK – Semiconductor memories will all but eclipse core by 1983 in the race to a $1.2 billion market of memory components for the U.S. computer industry, according to a recent report from Frost & Sullivan, Inc. here.

During 1974, the memory components market stood at $478 million, with semiconductor devices accounting for slightly over half the sales.

But by 1983, semiconductor memories, including metal oxide semiconductors (MOS) and bipolar semiconductors, could top $1.1 billion in sales, while core sales will slide from $200 million in 1974 to $85 million by 1983, the report said.

Read/write random-access memories (RAM) will continue to be the major memory type in the future, the study predicted.

RAM sales, including semiconductor and core, which reached $378 million in 1974, will top $842 million in 1983.

Read-only memory (ROM) sales, which hit $65.8 million in 1974, are expected to amount to $198.5 million in 1983.

Serial-access memory of the semiconductor type, which accounted for $33.5 million in sales last year, will account for $187 million in sales in 1983, the report said.

Continued Growth for Add-Ons

Memory systems for mainframe add-on applications will become an important business, particularly for suppliers of semiconductors, in the years ahead, according to the study.

The lucrative add-on memory market – particularly for the IBM 370 series – will continue to grow from $250 million in 1974 to nearly $1 billion by 1983, Frost & Sullivan said.

The growth in memory component and systems sales in the latter half of the 1970s will bring continuing changes in products and strategies of the suppliers, with the biggest problem being semiconductor memory obsolescence, the report said.

During 1975, 4K-bit MOS RAMs will eat into the sales of the mature 1K- and 2K-bit devices, and these earlier devices will be obsoleted long before suppliers get their return on initial investments, the report predicted.

Frost & Sullivan expects a similar situation to occur in bipolar memory components, with 1K-bit devices replacing 256-bit parts.

Improvements in memory density also will bring more high-speed devices. Newer semiconductor technology, such as silicon-on-sapphire complementary MOS memories, will have the potential of displacing parts that are still new today.

Narrowed Markets

Component suppliers will be forced to concentrate their attention on a particular segment of the industry, the report said. For example, it is possible companies offering devices for microprocessors will decide not to go after mainframe or peripherals business.

Microcomputers could become the largest market for all types of RAMs.

CDC Annual Report Cites Loss, Tells of Cut in Star Development

MINNEAPOLIS – The Control Data Corp. annual report contains several interesting items. The firm, which openly touts its "major thrust is data services supported by computer systems and peripheral equipment," will show a loss when its 1974 results are restated to conform with recent accounting standards.

CDC's auditors gave it a qualified opinion since it valued the securities of subsidiary Commercial Credit Co. "substantially above" market value as of Dec. 31.

In addition, the firm, which has been making cost reductions, has dropped development on small models of the Star, a large-scale computer.

By the end of 1975, CDC will have restated its 1974 results to reflect a loss of $1.275 million instead of its $3.725 million earnings.

The restated results, as required by the Financial Accounting Standards Board, reflect expensing as incurred the product and software development costs related to the acquisition of operating leases and certain costs incurred in the manufacture of standard software products.

The new ruling, effective this year, requires that previous financial statements be restated to reflect retroactive application of the standard.

CDC's auditors, Peat, Marwick, Mitchell & Co., issued a qualified opinion, noting, "Inasmuch as the value of the marketable equity securities is primarily dependent on future market conditions, we are not in a position to evaluate future recovery of cost and its effect, if any, on the related carrying value of the investment in Commercial Credit Co."

Glancing through the various sectors of CDC's business, revenues from data serv-

(Continued on Page 37)

Key Role for Peripherals Seen As Satellites Displace Phones

Special to Computerworld

LOS ANGELES – Revolutionary changes in data communications that will obsolete telephone lines as means of data communications were predicted here by Ryal R. Poppa, president and chief executive officer of Pertec Corp.

Poppa told a recent meeting of the Stockbrokers Society that major computer companies will have their own communications satellites and computer users will talk through these satellite stations, along with public carriers, at much reduced costs and faster speed rates than telephone lines.

Although telecommunications will play an increasingly important role in all business DP systems, "peripheral equipment will be an integral and essential part of each of these data communications networks," he said.

The tape drive market should continue its 20% growth rate – except during the current recession, he said. During 1975 the market will likely be "flat," he said.

Describing Pertec as the "dominant producer" with over 35% of the market last year, the firm's revenues from tape drives totaled over $19.5 million, he said.

Tape drives are responsible for about 80% of the volume of the firm's Peripheral Equipment Division, which also makes disks and floppy disks, he added.

Pertec's tape drive backlog is "greater at eight months than they were a year ago at this time."

The overall disk drive market should grow about 30% during 1975 fiscal year to about $50 million, he said.

"Our target is roughly 13% of that market," Poppa said. "We feel fairly confident we can achieve this objective, which is roughly a 3% increase in market share over our previous year's performance."

Poppa said, however, that he was a little disappointed in Pertec's progress in the floppy disk market where "the competition has turned out to be tougher than we originally expected" and into which Pertec made a late entry.

He estimated the floppy market at about $9 million for 1975, growing to $20 million in 1976.

Pertec, which now has about 5% of the market, hopes to get 20% of the market, he said.

Right now, Pertec's number one product is its shared processor, he said, and its major strength is its manufacturing capacity.

Univac has doubled its original $15 million order for shared processors and production is now up to 50 units a month, or $1.5 million worth of products monthly, Poppa noted.

UCC Consolidating Centers

DALLAS – University Computing Co. (UCC) will consolidate its domestic scientific and engineering computers into one "super center" here this summer.

Final plans are under way to move two more Univac 1108 computers into the Dallas center from East Brunswick, N.J., where a sales and service office and a connection point for customers in the Eastern U.S. will be maintained, Donald G. Thomson, UCC president, said.

When consolidation is completed, the Dallas center will have five Univac 1108s, a Control Data Corp. 6600 and two large-scale IBM 370 systems used in the company's Bank Service Center.

Consolidation Began in 1975

Since 1973 UCC has consolidated centers previously located in Chicago, Houston, Palo Alto and El Segundo, Calif.

"The main benefit of consolidating our equipment is increased efficiency and reliability," Thomson said. "Communications have improved over the past few years to the point where it makes little or no difference how close or how far away the computer is actually located from the customer's terminal."

The move has enabled UCC to "optimize our investment in computer applications technology and maximize the return on our investments in personnel, hardware and communications through centralized management," he added.

Michael F. Sivinski, UCC vice-president and general manager of the company's Scientific and Engineering Division, said the shift of equipment will be gradual, with each customer's specific requirements considered as an important element in the plan.

'Search' and 'Dialog' Share Award at IIA

NEW YORK – System Development Corp.'s "SDC Search Service" and Lockheed Information Systems' "Lockheed Dialog" were named corecipients of the Information Industry Association's (IIA) Information Product of the Year Award at HA's annual meeting here recently.

Twenty-six products were nominated for the award and selection of the winners was made by an independent panel of judges headed by Ted Slate, chief librarian of *Newsweek*.

The "two products in head-to-head competition have made a major breakthrough in the control and retrieval of a wide range of bibliographic data," Slate said.

Rep. Bella S. Abzug (D-N.Y.) called, in the keynote address, for an investigation of "waste and duplication in federal information gathering and dissemination" which, she charged, costs American taxpayers unnecessary millions of dollars.

Bell & Howell Forms Group To Develop, Sell COM Unit

NEWPORT BEACH, Calif. – Bell & Howell COM Products has been formed to assume responsibility for engineering, developing, marketing, distributing and servicing Bell & Howell's Model 3700 computer output microfilm (COM) recorder on a worldwide basis.

Services offered include systems analysis of COM user requirements, education and training for operators and systems staff, documentation and publications, coordination of a worldwide network of customer service centers and ongoing systems support.

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De Castro Says

Data General Has Outgrown 'Mini Supplier' Label

NEW YORK – Acknowledging the role Data General Corp. (DG) expects its Eclipse line to play, President Edson D. De Castro said the terminology of minicomputer supplier "is misleading today, and may become inaccurate in the future," when applied to DG.

"For our purposes, a more accurate description of our company would be a manufacturer of economical computers and associated hardware in the small and medium ranges of performance," he told a recent meeting at Merrill Lynch Pierce Fenner & Smith, Inc.

Although he noted the commercial Eclipse "is not for everyone," he said he expects demand for the machine will over the years "become considerably larger than today's traditional minicomputer volume."

Turning to the current economic situation, De Castro noted that customers are planning better, which is not necessarily resulting in improved sales.

"We see no evidence whatever that would show basic increases in the volume of our business.

"The uncertainties and confusion among our customers of the recent past appear to have largely disappeared. They are now planning their business commitments in a more coherent manner. But the net result is better planning, not improved sales," he said.

An increasingly large part of DG's business has been coming from sales to sophisticated end users, he said, noting that, originally, sales to systems houses or other OEMs represented the larger portion of DG's business.

"In the last two years, however, sophisticated end users have purchased systems directly as tools to deal with their own problems in increasing numbers.

"Today, end-user purchases represent a substantial part of Data General's business, and in recent months it has been the more vigorous market for our products," De Castro observed.

CDC to Show Restated '74 Loss

(Continued from Page 35)

ices grew 28% in 1974 over those of a year ago and the pace is expected to continue, the report said.

Time-sharing was the strongest growth area in the services arena, with time-sharing becoming available in Europe, Canada and Brazil.

CDC expects to deliver a "more versatile terminal" late this year to enhance its sports and entertainment ticket reservation service.

In the area of computer systems, the report acknowledged the adverse financial effects of large computer system development programs, both with Union Bank of Switzerland, which recently filed suit [CW, April 9], and the U.S. Air Force.

"Now, with the growth of our services business together with the CDC Cyber 170 computer line and the progress of our joint computer development program with NCR, there are alternatives to implementing the company's strategy.

"We can continue in the computer systems business and build upon our computer services strategy without taking as many risks associated with technical development under fixed-price contracts," the report said.

Customer shipments of the Cyber 170, which during in-house testing is proving the most reliable of any CDC-developed computers, are scheduled to begin mid-year, the report said.

Peripherals Products

In peripheral products, shipments to end users of other makers' CPUs highlighted 1974 results, according to the report. New orders exceeded $90 million and revenues doubled from a year ago. Another strong gain is expected in 1975.

Products for the OEM market continued as the largest segment of CDC's peripherals business in 1974, with sales reaching a record for the third straight year, up 10% over 1973.

Revenues from business products, such as disk packs, punched cards and computer forms, had a record year with revenues rising 30% from 1973.

Commercial Credit's financial services enterprise is seeking to reduce earnings fluctuations resulting from dramatic changes in interest rates by increasing the percentage of cash employed in business financing from 43% to 50%, as well as developing fee-based support services in the finance field.

Computer business revenue rose 16% over 1973. Rental and services rental increased 23%, with rental gains coming from leased computer systems and "substantial" additions to the base of peripheral equipment leased to users of other firms' CPUs. Services revenues reached $387.4, up 26%.

Lower Systems Sales

"Sales revenues also rose during the year with higher peripheral products and military products revenue offsetting lower computer systems sales revenue."

But computer business costs and expenses were up 27% over those of 1973.

Among the charges taken at the end of the year, in addition to $30.2 million provision for the Union Bank contract, was $6.1 million for an Air Force contract and other charges totaling $14.2 million.

Included in this $14.2 million was a $6.2 million charge to discontinue work on small models of the Star.

"The plan to use a Star-100 in the Cybernet data services network as a basis for building up customer applications workload does away with the requirement for smaller models of the Star," the report said.

During 1974, Commercial Credit's bad debt losses increased. Insurance losses and loss expenses increased to 73% of earned premiums compared with 66% in 1973, the report said.

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Government Largest Spender

'73 Canadian Service Bureau Revenues Mount 10%

By Gordon D. Hutchison
Special to Computerworld

OTTAWA – Canadian service bureau revenues increased 10% in 1973 over those of 1972, according to figures from the second annual survey of the industry by Statistics Canada.

Revenues grew to $589.7 million, contributed by 331 full-time service companies and 405 firms offering services as a secondary activity. Expenditures in the industry totaled $492.4 million.

The greatest single source of revenue was hardware sales and rentals, which contributed $376.5 million or 68%, the report said.

Processing accounted for $139.4 million or 23.7% of total revenues, of which 14.5% came from over the counter. Remote-access work amounted to 6.8%, and communications line charges and input preparation services provided the remaining 2.4%.

Manufacturing represented 13.7% of the total market while "primary industries" were responsible for 11.1% of the services revenues.

Transportation and communications contributed 8.3% of revenues while wholesalers and retailers stood at 8%, the figures showed.

International News

Equipment maintenance and education generated $37.8 million or 6.4%. Software packages and systems development work produced $36.1 million or 6.1%, most of which came from systems development.

Government edged out financial institutions as the largest spender for DP services, accounting for 16.7% compared with 16.6% for financial institutions.

Soviet Union Rapidly Developing Own Automated Control Systems

By Anatoli Arkhipenko
Novosti Press Agency

MOSCOW – The Soviet Union is rapidly developing automated control systems that are playing an increasingly important part in planning.

The role of the automated control systems extends from production control to providing input for local management to eventual coordination of data by central authorities for use in national and international planning.

The Soviet Union has begun to centralize automated management on a national scale using the Riad series of computers developed by several Eastern Bloc nations. The systems will be used to coordinate the economic activity of these countries.

The next step toward centralization will be a government network of computer centers that will ensure unity and interaction of all automated control systems.

The first stage of a nationwide automated plan calculation system will go into operation next year.

On a more local level, computer-based planning has increased the output of the instrument-making industry by $85.8 million a year.

Use of control systems is spreading rapidly. During the previous five-year plan period, 417 industrial systems were set up in the USSR. During the present plan period (1971-1975), the number will reach 2,700.

The Soviet Union allocates about 1% of all capital investments for building automatic control systems. This is considered a fairly significant sum, particularly since the cost of building automatic control systems for industry has dropped by one-half over the last three years.

The cost of an automated system used to control production processes is recouped in a year.

Do you get most of the trade magazines and still don't always have the facts about your market?

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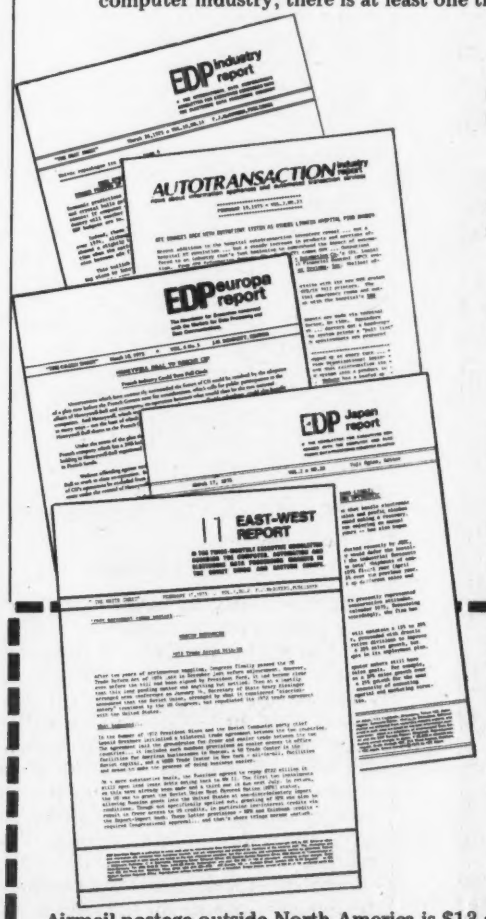

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Foreign Orders & Installations

The Institute of Management Technology in Nigeria has installed a Control Data Corp. Cyber 72 system to provide educational and government DP services for the country's East Central State Government.

Air Canada has ordered Incoterm Corp.'s SPD 20/20 intelligent terminals to provide increased reservations capability for the airline's Reservec II system.

Oesterreichische Volksbanken AG, the central headquarters for the Volksbanken chain of banks in Austria, has ordered a Univac 90/60 for on-line processing of current and deposit accounts and payroll preparation.

The Mitsui Bank of Japan has installed a Univac 1110 for use in on-line exchange operations.

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Honeywell First-Quarter Earnings Dive 63%

MINNEAPOLIS – Honeywell, Inc.'s first-quarter earnings plummeted nearly 63% from its restated earnings of $16.3 million in the year-ago period, while revenues eked ahead almost 3%.

A "significantly lower level" of outright sales of computer systems was one of two principal factors for the decline cited by Edson W. Spencer, Honeywell president.

The second element was "sharply lower shipments" of products from the Residential and Micro Switch Divisions, reflecting a continuation of the recession here and abroad.

Honeywell's earnings of $6.1 million or 31 cents a share compare with a restated $16.3 million or 85 cents a share in the year-ago period.

The 1974 figures were restated from the original $19.4 million to reflect a change in accounting to expense as incurred certain hardware engineering and product development costs.

Revenues climbed to $606 million compared with $588 million in the 1974 quarter.

Speaking of Honeywell's computer business, Spencer said "the decline in outright sales, together with the cost factors mentioned previously, combined to produce a loss for the first quarter.

"Improvement is anticipated in the second quarter, and we foresee profitable operations for the year as a whole unless there is further severe economic deterioration," he said.

Total computer revenues were about equal to those of the 1974 first quarter, with rental and service revenues rising 9.7% to $185.8 million, "an encouraging rate of gain for this significant indicator of long-run growth," Spencer said.

Total net bookings for computers declined from last year's period, with most of the decrease occurring in Europe.

Net DP backlogs at the end of the first quarter were higher than at both the first quarter and year end of 1974, while net shipments were off from the 1974 period.

Orders for the Series 60 systems, totaling $200 million in the first quarter, brought total orders to $650 million since April 1974, when that product family was introduced.

Viewing the overall corporate picture, Spencer anticipates some improvement during the second quarter over the first, but said "in view of continued softness in orders in many parts of the company, it is likely [results] will be down sharply from the 1974 second quarter."

Although raw materials costs have leveled or declined, wage and salary increases, coupled with unused production capacity, exerted continued pressure on profit margins, Spencer said.

Since the beginning of the year, Honeywell has reduced its total employment by over 3,300 to 88,800 and has reduced or plans to cut its manufacturing space by almost 625,000 sq ft.

Programs to improve asset management are proving successful and internally generated cash flow exceeded total fund requirements during the quarter, resulting in declining net borrowing levels, he noted.

Interest expense declined from year-end levels, but was still higher than in the year-ago period.

In ICC/Milgo-Western Suit

Definition of Term 'Licensee' Argued

MIAMI – The stream of verbiage continues to flow between plaintiff Western Electric Co. and defendants Milgo Electronic Corp. and its subsidiary, International Communications Corp. (ICC), in a patent infringement suit.

In replying to Western's motion to dismiss Milgo's motion for summary judgment [CW, April 23], Milgo focused almost exclusively on its earlier charge of Western and AT&T's "discriminatory royalty practices."

The requirement that a user of a non-Western-manufactured modem must pay a 2% royalty and a person using a Western-manufactured modem pays no royalty constitutes discriminatory royalty rates, Milgo charged.

The sharpest area of disagreement in the latest round of filings in the definition of licensee under the consent decree between the government and AT&T, the parent of Western.

ICC/Milgo maintained the consent decree covers all classifications: whether a person wants to use, make or sell the patented modems or any combination of the above, he is entitled to a license at nondiscriminatory rates.

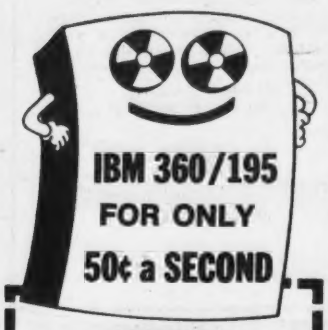
However, quoting from Western's previous filing, Milgo showed that Western does not include the user as a licensee.

"Simply by calling him a user-licensee, Milgo/ICC cannot convert such a telephone subscriber into a 'licensee under a patent license agreement from Western," Western had stated.

Milgo countered: "A user is just as much a licensee as a manufacturer under the terms of the decree, and both licensees are entitled to nondiscriminatory royalty rates.

"AT&T up to the present time has obviously always stood ready and willing to grant a license to either a user or vendor at a 2% royalty.

"Only now after their discriminatory royalty rate structure to users has been called to the court's attention do AT&T and Western argue that a user who has signed their written license agreement is not a licensee," said the Milgo filing.



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Orders & Installations

Oregon State University has installed a Control Data Corp. Cyber 73 system which, with a CDC 3300, serves 250 terminals.

The Newspaper Agency Corp. has ordered a Text II computerized composition system from System Development Corp. It will be used for ad taking, copy checking, credit checking, photo composition, billing and record-keeping related to classified ads.

The City of Seattle has installed an NCR Century 251 to handle payroll, utility billing, budgetary accounting and other general business applications.

Candler General Hospital in Savannah, Ga., will install a Univac 90/30 to replace an NCR 100 as part of its expansion program.

New York's First National City Bank will install an NCR Century 151 computer and 100 NCR 796 CRTs to automate its letter-of-credit and collection operations.

Dixie Rents, Inc. has ordered a Burroughs B700 computer to process profit-and-loss statements, invoicing and performance reporting and auditing reports from its 14 outlets.

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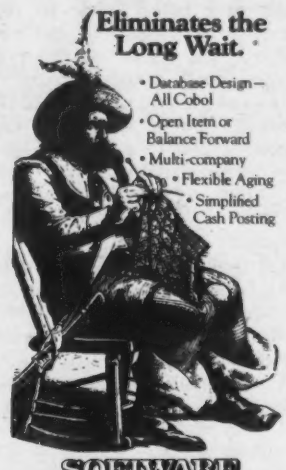

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Earnings Improve in Three Months at CDC

MINNEAPOLIS – Control Data Corp.'s first-quarter earnings were below those of the year-ago first quarter but improved over those of the preceding fourth quarter.

Income from its financial subsidiary, Commercial Credit Co. bettered that of a year ago, but the computer operations contributed $731,000 compared with $5 million in the year-ago quarter.

Corporate earnings totaled $11.1 million or 67 cents a share compared with a restated $15.3 million or 94 cents a share in the same 1974 period.

Commercial Credit contributed income of $10.3 million, $17,000 above that of the same year-ago quarter.

These results show marked improvement from the fourth quarter, when the firm lost $16 million after a $24 million loss from computer operations.

Revenues rose to $282 million compared with $249.4 million and included rises in both sales and rental and services revenue.

Rentals Outstrip Sales

The gain in rental and services revenue outstripped sales revenue. Rental and services brought in $147.3 million compared with $124.1 million in the year-ago quarter, while sales increased to $129 million compared with $120.8 million.

Chairman William C. Norris said cost-reduction programs begun in the second half of 1974 started to show meaningful results in the quarter, and these programs will continue in 1975.

Sharp declines in short-term interest rates aided the recovery in Commercial Credit's results, he said.

The 1974 figures were restated to expense R&D as incurred. Since amortization of past standard software products exceeded deferrals, earnings were $497,000 higher than originally. The rise in restated income is unique to the first quarter.

Growth for Year Expected

NCR Net, Sales Rise Over '74 Quarter

DAYTON, Ohio – NCR Corp., which attained a 19% rise in earnings and a 24% increase in revenues for the first quarter compared with figures of the year-ago period, expects "to achieve growth in revenues and earnings for the year as a whole, although the percentage improvements are not expected to match those recorded for the first quarter."

Foreign units were responsible for the earnings rise, as domestic earnings declined due to three principal factors cited by the firm:

- A substantial increase in expenditures for new product development.
- Reduced sales by NCR's Appleton Papers Division reflecting users' cutbacks in inventories.
- A downward adjustment of equipment production schedules to reduce inventory investment, which increased the amount of fixed costs charged to operations.

Greater deliveries of equipment in several countries were primarily responsible for the increase in revenues. These nations included the UK, Switzerland, Spain, France, Canada as well as several South American and Far Eastern countries, NCR said.

Earnings Up

During the quarter, NCR earned $14.3 million or 59 cents a share compared with $12.1 million or 51 cents a share in the same period last year.

Revenues totaled $478.9 million compared with $387.3 million in the same 1974 period.

NCR's incoming equipment orders are running modestly ahead of last year's pace, Chairman William S. Anderson said, adding that there are indications that, due to current economic uncertainties, some business equipment users are postponing or stretching out planned expansion programs to limit their 1975 capital expenditures."

Yearly Income Up at Scan-Data

NORRISTOWN, Pa. – Scan-Data Corp.'s revenues and earnings increased for the year ended Dec. 31.

Revenues rose to $9.6 million compared with $7 million during 1973, while earnings reached $119,304 or 73 cents a share, including a $50,500 tax credit.

This compared with earnings of $92,996 or 6 cents a share last year, when there was a $38,000 tax credit.

Scan-Data has increased its revolving lines of credit up to nearly $4.75 million through March 1, 1976 through an agreement with First Pennsylvania Bank N.A.

The company has also refinanced its subordinated convertible debt of $1.15 million due March 31, 1975.

Debt holders accepted an exchange offer of a new series of nonconvertible notes due March 31, 1980 with interest at 2% over prime rate.

Principal payments, payable annually March 31, begin in 1977.

Scan-Data has completed the repurchase of 29 optical character recognition systems, previously sold to lessor Alanthus Corp., for a total value of $3.4 million.

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Earnings Reports

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Three Months Ended Jan. 31

	1975	1974
Shr Ernd	$.06	$.06
Revenue	3,409,000	3,071,000
Tax Cred	108,000	102,000
Earnings	212,000	201,000

COMPUTER COMMUNICATIONS
Six Months Ended Dec. 31

	1974	1973
Shr Ernd	.....	$.10
Revenue	$2,405,197	2,443,834
Tax Cred	.....	125,000
Earnings	(45,457)	245,078

NATIONAL DATA
Three Months Ended Feb. 28

	1975	1974
Shr Ernd	$.10	$.05
Revenue	8,130,000	7,497,000
Earnings	542,000	290,000
9 Mo Shr	.28	.20
Revenue	24,107,000	23,884,000
Earnings	1,496,000	1,055,000

STANDARD COMPUTER
Year Ended Dec. 31

	1974	1973
Shr Ernd	$.01	$.09
Revenue	5,952,019	3,966,305
Earnings	34,188	423,733

APPLIED DIGITAL DATA SYSTEMS
Three Months Ended Feb. 28

	1975	1974
Shr Ernd	$.14	$.12
Revenue	3,269,240	1,741,187
Tax Cred	.....	254,000
Earnings	512,906	464,543

HAZELTINE
Year Ended Dec. 31

	1975	1974
Shr Ernd	.....	$.83
Revenue	$96,602,000	79,380,000
Tax Cred	.....	431,000
Earnings	(2,360,000)	1,624,000
3 Mo Shr	.....	.06
Revenue	25,677,000	24,630,000
Spec Chg	.....	78,000
Earnings	(2,006,000)	122,000

NATIONAL SEMICONDUCTOR
Three Months Ended Mar. 9

	1975	1974
Shr Ernd	$.24	$.31
Revenue	48,549,000	52,698,000
Earnings	3,120,000	3,894,000
6 Mo Shr	1.00	.92
Revenue	179,089,000	153,109,000
Earnings	12,453,000	11,207,000

EDP RESOURCES
Three Months Ended Jan. 31

	1975	1974
Shr Ernd	.....	.....
Revenue	$1,184,000	$1,621,000
Spec Cred	115,500	.....
Earnings	(32,594)	(883,000)
9 Mo Shr	.12	.....
Revenue	3,859,000	5,297,000
Spec Cred	240,500	.....
Earnings	89,406	(573,000)

MATHEMATICA
Six Months Ended Dec. 31

	1974	1973
Shr Ernd	$.49	$.46
Revenue	7,059,000	5,251,400
Earnings	342,000	321,400

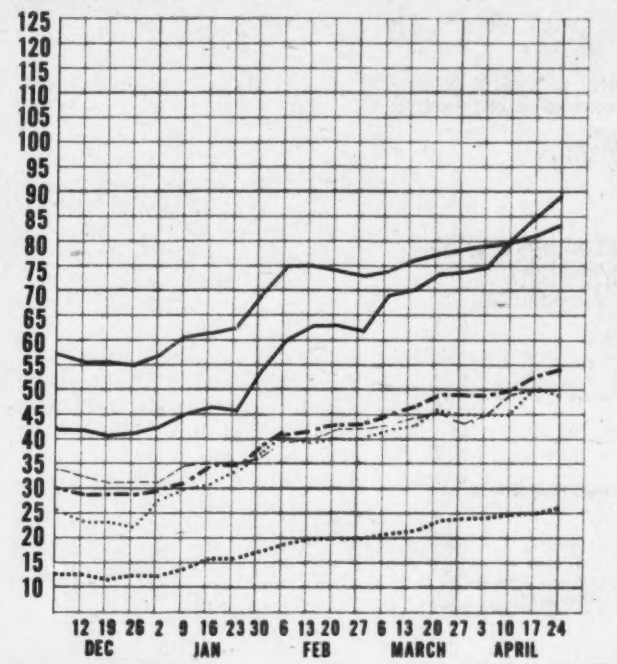
BRESNAHAN COMPUTER
Three Months Ended Dec. 31

	1974	1973
Shr Ernd	$.01	$.05
Revenue	910,000	1,222,000
Earnings	22,000	93,000

SCAN-DATA
Year Ended Dec. 31

	1974	1973
Shr Ernd	$.07	$.06
Revenue	9,568,462	7,002,514
Tax Cred	50,500	38,000
Earnings	119,304	92,996

COMPUTERWORLD Computer Stocks Trading Indexes



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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 24, 1975

All statistics compiled, computed and formatted by TRADE*QUOTES, INC. Cambridge, Mass. 02139

EXCH		1974 PRICE RANGE (1)	CLOSE APR 24 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	62-109	94 1/4	-3 1/4	-3.3
O	COMPUTER AUTOMATION	2- 14	6 3/4	- 3/8	-5.2
N	CONTROL DATA CORP	10- 38	19	+2 7/8	+17.8
N	DATA GENERAL CORP	10- 38	31 3/4	+2 3/4	+9.4
O	DATAPOINT CORP	5- 17	17	+1 3/4	+11.4
O	DIGITAL COMP CONTROL	1- 5	2 1/2	+ 1/4	+11.1
N	DIGITAL EQUIPMENT	46-121	106 1/4	+1 1/2	+1.4
N	ELECTRONIC ASSOC.	1- 3	2 1/4	- 1/8	-5.2
A	ELECTRONIC ENGINEER.	4- 11	9	- 1/2	-5.2
N	FOXBORO	19- 48	33 3/4	+4	+13.4
O	GENERAL AUTOMATION	6- 40	8 1/2	-2	-19.0
O	GPI COMPUTER CORP	1- 2	3/8	+ 1/8	+50.0
N	HEWLETT-PACKARD CO	54-109	105 1/4	+1 3/4	+1.6
N	HONEYWELL INC	18- 86	27 3/4	-2	-6.7
N	IBM	152-251	208	-4 3/4	-2.2
O	MFNOREX	2- 5	5 1/8	+1 1/8	+28.1
O	MICRODATA CORP	1- 5	3 5/8	+ 7/8	+31.8
N	NCR	14- 40	38	+1 3/8	+4.8
N	PERKIN-ELMER	15- 48	28	+ 7/8	+3.2
N	RAYTHEON CO	21- 48	39 1/4	0	0.0
N	SPERRY RAND	24- 44	40 1/4	+ 3/4	+1.8
A	SYSTEMS ENG. LABS	1- 4	3 5/8	- 1/8	-3.3
O	ULTIMACC SYSTEMS INC	1- 2	3 3/4	- 1/4	-6.2
N	VARIAN ASSOCIATES	6- 13	9 1/4	+ 1/4	+2.7
N	WANG LABS.	7- 20	13 5/8	- 1/2	-3.5
N	XEROX CORP	50-127	73 5/8	+ 7/8	+1.2
	LEASING COMPANIES				
O	COMDISCO INC	1- 7	3	- 3/8	-11.1
A	COMMERCE GROUP CORP	2- 6	2 7/8	- 3/8	-11.5
A	COMPUTER INVSTRS GRP	0- 4	7/8	+ 1/8	+15.3
M	DATRONIC RENTAL	1- 1	5/8	0	0.0
A	DCL INC	0- 1	1/2	0	0.0
N	DPF INC	2- 5	4 1/4	- 1/8	-2.8
O	EDP RESOURCES	2- 3	2	0	0.0
A	GRANITE MGT	1- 5	4	- 7/8	-17.9
A	GREYHOUND COMPUTER	2- 6	2 5/8	+ 1/8	+5.0
A	ITEL	3- 7	6 3/8	+ 1/4	+4.0
N	LEASCO CORP	5- 12	5 5/8	- 1/2	-8.1
O	LEASPAC CORP	1- 2	1/2	- 1/4	-33.3
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NPG INC	1- 5	2 3/4	- 1/4	-8.3
A	PIONEER TEX CORP	2- 10	3 1/8	- 1/8	-3.8
A	ROCKWOOD COMPUTER	0- 1	5/8	+	+10.0
N	U.S. LEASING	5- 24	11	0	0.0

EXCH		1974 PRICE RANGE (1)	CLOSE APR 24 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 1/4	0	0.0
A	APPLIED DATA RES.	1- 10	1 3/4	+ 1/4	+16.6
N	AUTOMATIC DATA PROC	21- 57	48 1/4	0	0.0
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	CENTRAL DATA SYSTEMS	4- 6	3 1/4	0	0.0
O	COMPUTER DIMENSIONS	1- 3	3	+ 1/4	+9.0
O	COMP ELECTION SYSTMS	3- 4	3 7/8	0	0.0
O	COMPUTER HORIZONS	1- 5	1 1/8	+ 1/8	+12.5
O	COMPUTER NETWORK	1- 2	1 1/2	+ 1/8	+9.0
N	COMPUTER SCIENCES	2- 4	4	+ 3/8	+10.3
O	COMPUTER TASK GROUP	1- 1	5/8	0	0.0
O	COMPUTER USAGE	2- 4	2 1/2	+ 1/4	+11.1
O	COMSHARE	2- 4	3 3/4	+ 1/8	+3.4
O	DATATAB	1- 3	1 1/8	0	0.0
A	ELECT COMP PROG	1- 1	1/4	0	0.0
N	ELECTRONIC DATA SYS.	11- 25	17 7/8	+1	+5.9
O	INFONATIONAL INC	1- 2	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	3/8	0	0.0
O	KEANE ASSOCIATES	2- 4	3 1/4	0	0.0
O	KEYDATA CORP	1- 6	2 7/8	+ 1/8	+4.5
O	LOGICON	2- 5	5 1/8	0	0.0
A	MANAGEMENT DATA	1- 2	2 1/4	- 1/8	-5.2
O	NATIONAL CSS INC	5- 37	8 1/2	-1	-10.5
O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0
A	ON LINE SYSTEMS INC	9- 30	8 7/8	- 1/8	-1.3
N	PLANNING RESEARCH	2- 5	3 7/8	0	0.0
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	1- 5	2 1/4	- 1/8	-5.2
O	SCIENTIFIC COMPUTERS	1- 1	1	- 1/8	-11.1
O	SIMPLICITY COMPUTER	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 12	11 1/2	- 1/4	-2.1
O	UNITED DATA CENTER	2- 4	2 7/8	0	0.0
A	UPS SYSTEMS	2- 4	2 5/8	- 1/8	-4.5
N	WYLY CORP	1- 5	3 1/8	- 1/8	-3.8
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	3- 11	7 5/8	+1 1/4	+19.6
O	ADVANCED MEMORY SYS	1- 7	4 1/8	+ 1/2	+13.7
N	AMPEX CORP	2- 5	4 7/8	+ 1/8	+2.6
O	ANDERSON JACOBSON	1- 4	2 7/8	0	0.0
O	BEEHIVE MEDICAL ELEC	1- 7	2 3/4	+ 1/4	+10.0
A	BOLT,BERANEK & NEW	5- 9	7 3/8	- 3/8	-4.8
N	BUNKER-RAMO	3- 8	6	- 3/8	-5.8
A	CALCOMP	4- 11	6	- 5/8	-9.4
O	CAMBRIDGE MEMORIES	3- 16	3 1/4	- 5/8	-16.1
N	CENTRONICS DATA COMP	7- 23	18 3/8	+ 3/4	+4.2
O	CODEX CORP	8- 27	26 1/4	+2 1/2	+10.5
O	COGNITRONICS	1- 2	1/2	0	0.0
O	COMPUTER COMMUN.	1- 2	1/2	- 1/8	-20.0
O	COMPUTER CONSOLES	2- 4	3	0	0.0
A	COMPUTER EQUIPMENT	1- 2	1 3/4	+ 1/8	+7.6
O	COMPUTER MACHINERY	1- 5	1 1/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 2	1 1/2	0	0.0
O	COMTEN	1- 5	3 1/8	0	0.0
N	CONRAC CORP	10- 22	19 1/8	+ 1/8	+0.6
O	DATA ACCESS SYSTEMS	2- 3	2 1/2	0	0.0
O	DATA 100	4- 14	12 1/4	- 1/4	-2.0
A	DATA PRODUCTS CORP	2- 5	3 7/8	- 1/8	-3.1
O	DATA TECHNOLOGY	1- 4	1 3/8	- 1/8	-8.3
O	DATUM INC	1- 4	1	0	0.0
O	DECISION DATA COMPUT	3- 13	4	+1 3/8	+29.7
O	DELTA DATA SYSTEMS	1- 2	1/4	0	0.0
O	DIGAN CONTROLS	1- 2	1	+ 1/4	+33.3
N	ELECTRONIC M & M	1- 4	2 1/8	+ 1/4	+13.3
O	FARRI-TEK	1- 3	1 1/8	+ 1/8	+12.5
O	GENERAL COMPUTER SYS	1- 4	1 1/2	0	0.0
N	HAZELTINE CORP	2- 7	3 1/4	+ 1/8	+4.0
N	HARRIS CORP	13- 34	18 1/4	-1	-5.1
A	INCOTERM CORP	1- 6	4 1/4	+ 1/2	+13.3
O	INFOREX INC	1- 5	3 3/4	+1	+36.3
O	INFORMATION INTL INC	6- 14	11	+ 1/8	+1.1
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	5/8	+ 1/8	+25.0
A	MILGO ELECTRONICS	6- 18	15	0	0.0
N	MOHAWK DATA SCI	1- 4	2 3/4	0	0.0
O	OPTICAL SCANNING	2- 6	2 1/4	- 1/2	-18.1
O	PERTEC CORP	1- 8	6 1/8	-1 1/8	-15.5
A	POTTER INSTRUMENT	1- 5	1 3/4	0	0.0
O	PRECISION INST.	1- 3	1/4	0	0.0
O	QUANTOR CORP	2- 8	3 1/2	+ 1/4	+7.6
O	RECOGNITION EQUIP	2- 5	4 7/8	- 1/8	-2.5
N	SANDERS ASSOCIATES	2- 8	5 5/8	0	0.0
O	SCAN DATA	1- 3	2 1/2	+1	+66.6
O	STORAGE TECHNOLOGY	6- 15	9 5/8	- 3/8	-3.7
O	SYCOR INC	4- 13	8 1/2	+ 3/4	+9.6
O	TALLY CORP.	1- 4	3 1/8	+ 1/4	+8.6
O	TEC INC	1- 7	2 1/2	0	0.0
N	TEKTRONIX INC	18- 48	32 1/2	-1 5/8	-4.7
N	TELEX	1- 4	1 3/4	- 1/8	-6.6
O	WANGCO INC	3- 13	3 5/8	- 1/2	-12.1
O	WILTEK INC	1- 8	2 1/4	0	0.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	4- 6	5 1/4	0	0.0
A	BARRY WRIGHT	4- 7	5 1/2	0	0.0
O	CYBERNATICS INC	1- 2	5/8	0	0.0
A	DATA DOCUMENTS	23- 54	37	-1 1/2	-3.8
O	DUPLEX PRODUCTS INC	6- 23	21 3/4	- 1/4	-1.1
N	ENNIS BUS. FORMS	4- 7	7	+ 1/8	+1.8
O	GRAHAM MAGNETICS	5- 11	7	+ 1/4	+3.7
O	GRAPHIC CONTROLS	6- 16	15 1/2	+ 1/4	+1.6
N	3M COMPANY	43- 79	57 3/4	+3 1/8	+5.7
O	MOORE CORP LTD	33- 57	46 3/4	0	0.0
N	NASHUA CORP	15- 45	15 5/8	-1 3/8	-8.0
O	REYNOLDS & REYNOLD	6- 35	21 1/2	0	0.0
O	STANDARD REGISTER	10- 18	17	- 1/2	-2.8
O	TAB PRODUCTS CO	4- 11	6 1/2	0	0.0
N	UARCO	13- 23	19 1/4	+ 1/2	+2.6
O	VANIER GRAPHICS CORP	3- 6	4 1/4	+1	+19.0
A	WABASH MAGNETICS	3- 7	4	+ 1/2	+14.2
N	WALLACE BUS FORMS	14- 25	23 7/8	-1 3/8	-5.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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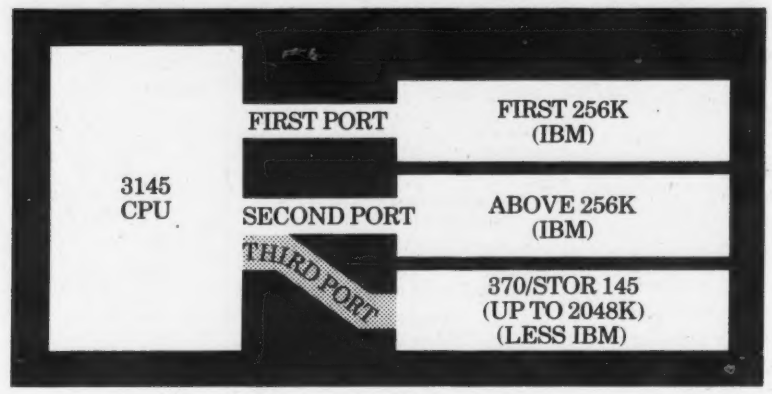

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